A Database Publication

THE MICRO USER

Volume 9 Number 2 April 1991 £1.50

HEAD TO HEAD

Cure the problems of sticky printer pins

EXILE CHEAT

Definitive solutions to the ultimate game

STRANGENESS

Create amazing graphics from very simple maths

PROTECTION

Stop unauthorised disc accesses

REVIEWS

Toby by the SeaSide
Freddy Teddy
Control on the Archimedes
File handling for all
Impression II
Key Plus
Zillion
...Plus all the latest games

Viruses

CAN THEY BE LETHAL?

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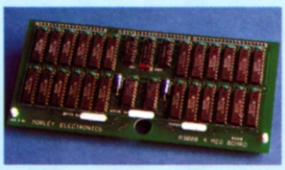

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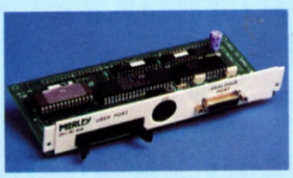

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Managing Editor Derek Meakin

Features Editor Steve Turnbull

Art Editor Tym Leckey

Production Editor Peter Glover

Reviews Editor Pam Turnbull

Technical Editor Mike Cook

Group Advertisement Manager John Snowden

Advertising Sales Yvonne Johnson

John Wier Marketing Manager

Tel: 0625 878888 (All depts.)
051-357 2961 (Subs.)

Telex: 94081191
Prestel Mailbox: 614568383
Fax: 0625 879966

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SPECIALS

COVER STORY

IN this complete report we reveal the truth about computer viruses and how they can affect you. Turn to Page 64.

35 **Print head**
Having trouble with clogged pins on your printer? Find out how you can fix it – safely.

48 **Strange Attractors**
Start of a new series on a fascinating branch of mathematics that produces some very pretty pictures.

Type-it-in

This symbol indicates that the feature contains at least one full length listing for you to key in on your micro.

Get it right

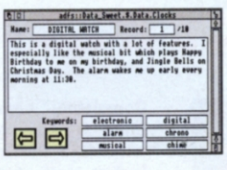
All the major listings in this magazine are accompanied by checksums to help you key them in correctly. For full details of how to use them see the article on page 56 of the February 1991 issue.

Education

21 **Update**
Up-to-the-minute news of the Acorn range of micros in use in the world of education

27 **Reviews**
Catch up on the latest software for the BBC Micro series in schools, including:

- Toby at the Seaside
- Freddy Teddy
- Data Sweet
- Key Plus
- Zillion



MICRO USER CLASSIFIEDS

The best bargains in the world of all Acorn micros come from fellow readers of The Micro User. Turn to Page 46 to find just what you're looking for – from cheap modems to complete computer systems.

REGULARS: News 9 ● Problem solved

SPECIALS

53 **Got it wrong**
The concluding part of our series on how to get those pesky bugs out of your programs.

60 **Game Diary**
The continuing saga of how a commercial game was brought to your screen – as told by the author.

89 **Return from Exile**
At last, the definitive work to free all disc users from the trials of this arcade adventure.

105 **Disc protection**
Get an early warning of any program that tries to tamper with your 32 bit Archimedes or BBC A3000.

Newcomers

17 **Impression II**
With features added and bugs removed how does this version of Impression fare?

25 **I-image**
The first colour scanner for the Archimedes and BBC A3000 is put through its paces.

62 **DTP Seeds**
A book without a words? Not quite, but this one's crammed with ideas to improve your layouts.

MASTERBREAK COMPETITION

Your chance to win great prizes in this fun competition courtesy of Superior Software. Turn to Page 101 to find out what you have to do.

FREE Software

Subscribers to *The Micro User* will receive the following software on disc or tape wth this month's magazine:

- Three Exile cheats
- Strange Attractors
- Multiple label spotter

In addition, those readers with a BBC A3000 or Archimedes series machine will also get:

- Disc Protector
- Virus Killer
- Sparkplug
- Plus 735k of PD software

For new subscribers there's a special gift: A free binder to keep your copies of The Micro User.

Find out how to subscribe on Page 56

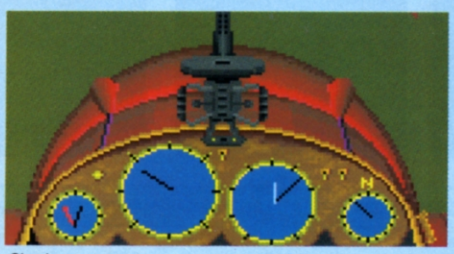
16 **Our experts reveal what's new among the latest games releases**

SOFTWARE SCENE

PREVIEW

Karma

Crisis



Chocks away

Mah Jong Patience

Key to which micro articles are suitable for

- Electron
- BBC B
- BBC B+
- Master 128
- Master Compact
- Archimedes series and BBC A3000

NEXT MONTH IN **THE MICRO USER**

We have a special programmers issue full ot utilities and ideas to help you whatever Acorn machine you use. Not forgetting all our regular features plus our PD section full of great money-saving ideas.

Mad Hatter 86 ● Letters 97 ● Body Building 102

A3000 ARCHIMEDES BBC B/MASTER ELECTRON

THE 4TH

Chocks away

This new upgraded Mark II Chocks Away with supersmooth animation really is flight simulation the way you've always wanted it. It has everything for the beginner and the expert:

- Beautiful 256 colour graphics and 'nerve shattering' digitised sound effects
- Easy to fly, yet highly manoeuvrable bi-plane - ideal for all ages/skill levels
- Revolutionary 2 Player Option using split screen display. This allows 2 players to each fly their own planes simultaneously in practice, dogfights or missions
- Full joystick, dual joysticks, mouse and keyboard control options
- Amazing "Black Box Flight Recorder" included so that you can record your own flights and then save and replay them. 90 minutes of totally absorbing pre-recorded training flights are included with the game
- Internal/External views of your plane can be selected from front/rear/left/right
- Powerful 30mm cannon capable of very rapid fire and long range destruction
- Easy to read instrument panel and simple controls
- 3 very varied immense maps to explore - approximately 18000 km² in total
- 20 fascinating and varied missions of increasing complexity are included with a promotion system from Cadet right through to Marshal of the RAF
- Superb range of targets/enemies including bombers, triplanes, fighters, tanks, control towers, anti-aircraft guns, head quarters and patrol boats

Chocks Away Mark I Version was awarded GAME OF THE YEAR 1990 by Acorn User, A&B Computing (now Archimedes World), Risc User & Micronet

"Graphics in the game are superb, smooth and with plenty of ground detail..... this is a really enthralling flight simulator with plenty of variation and features to ensure longevity." **Risc User, Dec '90**

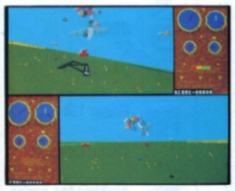
"Chocks Away is a delightful game." **Archive, Jan '91**

"Chocks Away is a brilliant game." **BBC Acorn User, Dec '90**

"...it's a really great game. Playability 10. Value 10." **The Micro User, Jan '91**

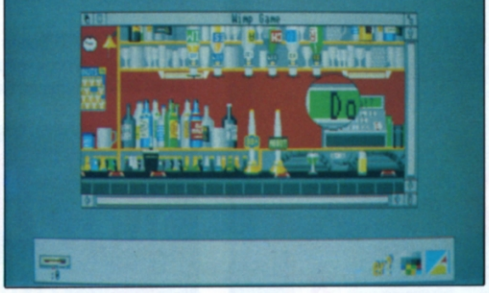
"(Chocks Away Mark II Version)... The increased speed obviously makes the game more responsive and fun to play, well and truly overtaking Interdictor II as the best Archimedes plane game." **New Computer Express, Feb '91**

Price: A3000/Archimedes £24.95



The Wimp Game

Windows - Icons - Mouse - Pointer



The Wimp Game is a brilliant pointer driven graphic adventure celebrating over 10 years of Acorn Home Computers. This revolutionary multi-tasking game is unlike any other game produced for the Archimedes and even allows you to run other programs in Desktop whilst you play it.

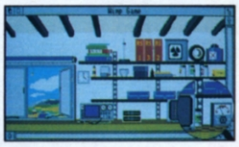
Work your way through the very different and very detailed locations using your pointer to 'try out/use' the many objects and your magnifying glass to examine them.

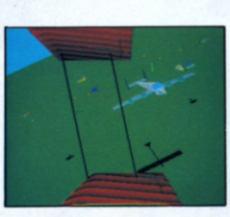
The Wimp Game has no time limit, no help, no hints, no score, no little green men, no space ships, no bombs and no guns. No keys on the keyboard are used. Your aim is to progress from being the owner of an Acorn Atom to being the owner of an Acorn R200 - who said they'd already got one?

"This is a splendid piece of games software and I am sure it will be a great success. It has that all-important element of addictiveness, and once you start you won't be able to leave it alone." **Risc User, Feb '91**

"I only have one complaint about this game - it prevents you from getting any other work done!" **Archive, Dec '90**

Price: A3000/Archimedes £19.95



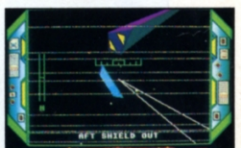


This 4 game collection really is The Real McCoy. These are genuine top games in their original format with full instructions. The games have been carefully selected for variety and include a thinking game, a sports game, a role playing adventure and an arcade game. Bought individually they would cost £81.80p making this a very prestigious special edition collection.

U.I.M. (RRP £29.95)

U.I.M. (Ultra Intelligent Machine) is a futuristic action adventure set in the oceans. It is a huge game featuring solid 3 dimensional graphics and digitised sound effects. You must travel the oceans in your highly expandible submarine visiting the numerous ports throughout the ocean networks. As well as gaining combat skills you'll need to learn to trade in commodities, shares and currencies. There are over 250 missions to complete before you will find your goal - the U.I.M. - created to be almost a god.

Price: A3000/Arc



A3000/Archimedes Games and Prices

Chocks Away	24.95	UIM (3D Action Adventure)	29.95
The Wimp Game	19.95	E-Type (3D Car Racing)	19.95
The Real McCoy	29.95	E-Type Designer	16.95
Dropship	19.95	E-Type Extra 100 Miles	16.95
Break 147	24.95	White Magic (Arcade Adventure)	19.95
Nevryon (Pure Arcade Action)	19.95	White Magic 2 + Designer	19.95
Pysanki (Arcade Adventure)	19.95	Arcade Soccer	19.95
Inertia (Isometric Action)	19.95	Holed Out (3D Golf)	19.95
Apocalypse (3D Mega Game)	29.95	Holed Out Extra Courses 1	16.65
The Olympics (6 Events)	19.95	Holed Out Extra Courses 2	16.95
Man-At-Arms (Arcade Adventure)	19.95	Holed Out Designer	19.95

All the above Archimedes games will work on the Archimedes A3000, 310 and 400 series

BBC & Electron Games

	BBC B and Master 51/4" Disc	BBC and Electron Cassette	Master Compact 31/2" Disc
UIM (3D Action Adventure)	19.95	-	21.95
E-Type (3D Car Racing)	14.95	9.95	15.95
Inertia (Isometric Action)	12.95	9.95	13.95
Nevryon (Arcade Action)	14.95	-	15.95
White Magic (Arcade Adventure)	12.95	9.95	13.95
White Magic 2 + Designer	12.95	9.95	13.95
Arcade Soccer	12.95	9.95	13.95
Holed Out (3D Golf)	14.95	12.95	15.95
Holed Out Extra Courses 1	11.95	9.95	12.95
Holed Out Extra Courses 2	11.95	9.95	12.95

All the above BBC games are compatible with BBC B, B+ & Master Series Computers

DIMENSION

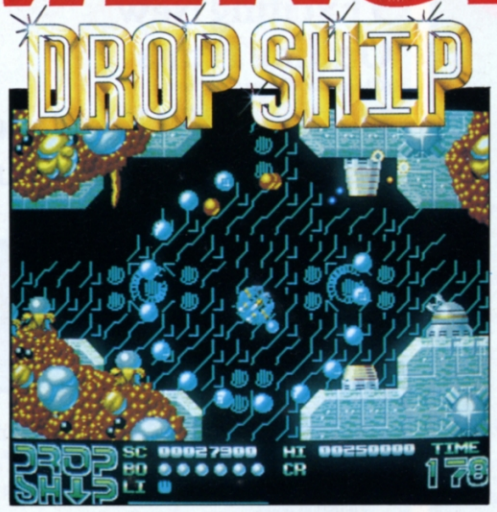
A3000
ARCHIMEDES
BBC B/MASTER
ELECTRON

ARCADE SOCCER (RRP £19.95)
Arcade Soccer really is WORLD CUP FOOTBALL ACTION at its very best. Using an overhead view to make gameplay as exciting as possible it features everything that you could want in a football game.

WHITE MAGIC (RRP £19.95)
White Magic is a unique arcade adventure in which you control 4 varied adventurers:- A Leprechaun, Titan, Warrior and Enchanter.
You can transform between all 4 characters at will and use their much needed special abilities. White Magic is not a game for the faint-hearted; it is a fast-action game which requires fierce hand-to-hand combat and frantic weapon fire.

QUAZER (RRP £11.95)
Quazer is a fast action arcade style game with excellent music, sound effects and graphics. It has 11 incredibly detailed and varied vertically scrolling levels filled with the most amazing assortment of baddies you are ever likely to see.

DROP SHIP



Drop Ship is one of the smoothest and fastest arcade games you are likely to see. It features superb 256 colour graphics, 15 increasingly large diverse stages and an excellent stereo soundtrack.

The Year is 2020... The government proudly announces that the new fast breeder farm on the Mars colony is completely computer managed and totally safe, defended from attack at all times by a fully automated tactical defence system.

The Year is 2030... Earth receives a transmission from the Mars colony. The radiation seems to have affected the management software at the fast breeder farm. The defence systems have gone haywire and the whole farm is rapidly approaching meltdown. If all the reactors are not shut down the Mars colony will be wiped out. The defences include gun emplacements, artificial gravity generators, sporers and hoards of deadly aliens. What is needed is a craft which is supremely manoeuvrable, capable of great speed and possessing awesome fire power, and a pilot of extraordinary bravery to fly it. The craft is the Drop Ship. The pilot is you.

"A brilliantly addictive game which really makes you want to barricade yourself into a room for a week in order to finish it... The graphics and animation are really superb." **BBC Acorn User, Jan '91**
"Compared to both Rotor and Caverns, this game has to be tops. The gameplay is even more difficult than both and the graphics and sound far better." **Risc User, Dec '90**
"Drop Ship is very arcade-like, with excellent graphics, the smoothest movements in town, nice sound effects and a good short demo." **Archive, Jan '91**

Price: A3000/Archimedes £19.95

BREAK 147

By any measure snooker is one the most popular sports in the world today. Break 147 has been precisely designed exclusively for the A3000 and Archimedes computers to be as close as is possible to the real game itself.

Break 147 is a full 3D snooker simulation with superb solid graphics and brilliant digitised sound effects, speech and music. The game is controlled exclusively with the mouse.

It features incredibly realistic interaction between the balls and precise control of the cue ball - topspin, backspin, stun, screw, drag, swerve and masse shots. You can view the table from ANY angle or distance even as the balls are moving.

All the rules are fully implemented and you can play matches against friends or computer players, trick shots or just practice. You will not only be able to replay your last shot but you can also replay whole frames and move in and around the table as you watch it. Highest breaks are saved automatically to disc.

You can even create and edit your own tables so you can design your own trick shots or set up your preferred practice positions. A manual is supplied with each game which gives the fascinating history of snooker and all the rules and instructions required to play BREAK 147.

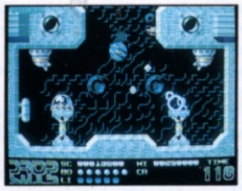
You will find that the game plays as if you were on a real snooker table with all the attendant features to take care of, but with a lot of the tedious parts - such as resetting the table, respotting the balls, and scoring - maintained by your computer.

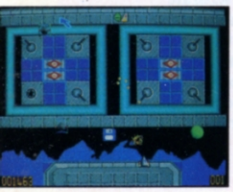
Win a Superb Engraved Trophy
This unique competition allows everyone who obtains a break of 100 or more to win a superb engraved snooker figurine on a solid marble base.

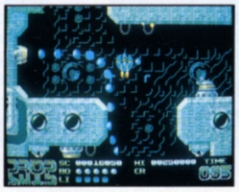
There's also a superb 16" trophy (to be engraved with the winners name) which will be awarded to the first entrant to achieve the maximum break of 147. Full details and entry coupon are included with the game.

RELEASE
Expected next
May '91

Price: A3000/Archimedes £24.95
Anticipated Release Date: Mid November '90







Screen shots from early development version

... HOW TO ORDER... HOW TO ORDER... HOW TO ORDER...

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Most of our games are available from most good dealers. If they don't stock them, then please give them a copy of this advert and tell them that they can easily buy them directly from us.

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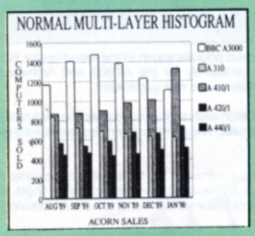

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News BEAT

Blues for the Arc?

FRANK Furillo, Joyce Davenport and Andy Renko could be making an appearance on Archimedes screens. Krisalis Software (0709 372790) hints that it may be launching an Arc version of cult American cop series Hill Street Blues.

If plans go ahead it will be one to look out for. To be launched over the next couple of months, the 16 bit versions recreate the Hill Street precinct featuring up to 600 vehicles and more than 600 pedestrians.

The player becomes Captain Furillo with all the characters of the TV series at his disposal to combat crime.

"We are hoping to bring this out for the Archimedes, but before we make the final decision we are waiting to see how it will go on 16 bit and how it will convert", said Allison Key of Krisalis.

Also possibles for the Archimedes are Jahangir Khan Squash and Manchester United European Championship Boxing Manager. Completely repackaged and tweaked, it's a multilingual game where the player becomes a boxing manager striving to make the best decisions for his stable of fighters. Price, £24.99.

Edition. Meanwhile Krisalis has just released an Archimedes version of the Goliath Games title World

Acorn extends

DESPITE determined attempts by other companies to move into the education market, Acorn Computers not only retains its grip on its traditional sector but is also tightening the hold. Latest independent market research confirms that Acorn are still by far the major suppliers of computers to UK schools at all levels.

Findings by MaS show that in the first eight months of the current financial year, Acorn sold more computers into UK education than all their competitors combined, cornering 53 per cent of the market.

Star of the show is the BBC A3000 which research confirms as the largest selling computer in schools. The A3000 and Archimedes now outsell the Master 128 by a factor of two to one.

Acorn's lead is even greater if the primary sector is taken individually. They sold more than two thirds of all computers bought by primary schools. Forty per cent of machines bought by secondary schools also came from them.

Acorn systems are now installed in 85 per cent of UK schools and the MaS data shows that since April last year, 73 per cent of schools buying computers chose Acorn. Their nearest competitor sold to less than a quarter of all schools.

Dataquest figures have confirmed the BBC A3000 as the fourth largest selling computer across all markets and put Acorn at number eight in the manufacturers' league for the UK.

"These figures once again ➤

Indian fonts taking shape

THE Electronic Font Foundry (0344 28698) have added a number of foreign texts to their range of fonts for use on Archimedes machines.

Launched in January were Cyrillic, Greek and Hebrew and due out soon are a series of Indian fonts including six styles of Bengali, ten of Devangari, five Farsi fonts, 10 Gujarati, nine Punjabi and six Tamil.

All font packs are supplied with the outline font manager as a matter of course and it also comes with individual fonts if requested. In both cases it is free of charge.

The Indian fonts have been bought from another company and transferred to Archimedes standard by Electronic Font Foundry. They include hinting and come in standard, italic, condensed, condensed italic, extended and extended italic faces.

Price of individual fonts is £75 and full sets range up to £199.

Dabhand Computing Ltd.

TERMS: UK residents add 15% VAT to all prices, except books. Delivery FREE on all postal items in the UK. Export, no VAT, carriage at cost. (quotations available). Europe maximum £2.50 software, £35 hardware. Access/Visa cards accepted by post/phone/in person. We are authorised Acorn dealers. Official orders accepted from public sector/education/PLCs, otherwise cash with order. Tender invitations welcome. Callers welcome. We are about 800 yds north of J17, M62. Fax: 061-766 8425. Price subject to change without notification. Goods offered subject to being unsold.

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* Pack includes PC Emulator, 1st Word Plus, Genesis. ** + Acorn DTP.

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Midi Upgrade Rom	£14
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A410/2 20 Mb £1099
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Dabhand ST506 Hard Disc Drives

Archimedes A410 Internal Hard Disc Drives for use with 'on-board' ST506 winchester controller. Comes complete with mounting chassis, screws, connecting cables and easy to follow fitting instructions.

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Please refer to Oak External SCSI prices in the opposite column as prices for A3000 external units are the same.

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Atomwide Ram Upgrades
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4Mb upgrade to above board £200
4 Mb Ram Upgrade £245

A3000 Upgrades

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5.25" External floppy disc buffer (Pres)	£46
Dust cover (Keyboard + Monitor)	£12
Monitor Stand (Oak)	£21
Monitor Stand (Pres)	£24
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VIDC Enhancer	£29

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Fast Samsung Ram complete with step by step fitting instructions.

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Additional upgrades for Dabhand Packs

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Up to 40 Mb Hard Disc £116
Up to 47 Mb Hard Disc £176
Up to 4 Mb Ram + 40 Mb £236
Up to 4 Mb Ram + 47 Mb £296

Please add these prices to the base system prices quoted above.

Floppy Disc Drives

5.25" Single 40/80 no psu	£95
5.25" Single 40/80 with psu	£109
5.25" Dual 40/80 no psu	£185
5.25" Dual 40/80 with psu	£199
3.5" Single with psu	£85
3.5" + 5.25" 40/80 no psu	£185
3.5" + 5.25" 40/80 with psu	£209

Printers

Citizen 120D+ (Serial add £20)	£129
Citizen Swift 9	£179
Star LC10	£139
STAR LC200 COLOUR (9 pin)	£199
CANON Bubblejet BJ-10e	£289
Canon Bubblejet BJ-130e	£449
Sheetfeeder for BJ-10e	£59
Citizen Swift 24	£249
Colour Kit for above (also Swift 9)	£39
STAR LC24 - 200	£239
STAR LC24 - 200 COLOUR	£289
Sheetfeeder for LC24 - 200	£69
Integrex Colourjet 132	£519
HP Paintjet	£795
LASER DIRECT (Qume)	£899
LASER DIRECT (LPB8 Hi Res.)	£1349

Midnight Graphics Products

Midnight Tracer

!Paint to !Draw conversion, turn your sprite files into fully editable object orientated draw files which can be scaled, rotated and manipulated without any loss of detail.

Ideal for users of all Desktop Publishing and Scanning packages. Accepts any sprite file and offers many image processing facilities. Translation can be colour or monochrome, includes a unique automatic tracing feature, variable trace options and curve fitting facilities.

The manual includes a user friendly tutorial with hints and tips on how to obtain the best results from your sprite files.

!Tracer is an ARM coded Risc OS multitasking application and will easily run on a 1Mb machine.

Midnight Tracer £52.13

Colour Sprite Dumps

Dot Matrix Sprite Dumps

Scaling available - any ratio is possible. Draft, double or quad density, for optimum speed or optimum quality

Choice of special dithering patterns for best effect

The printer driver uses a dithering pattern to produce the required colours on the printout. The first pattern produces bright sharp colours, very similar to those on screen. The second pattern is used to reduce the 'moire' effect resulting in more subdued colours.

Integrex 132 and HP Paintjet

The HP Paintjet dump has an OHP feature which allows the creation of slides and transparencies for use in presentations.

Available for all popular colour printers.

Sprite dumps £26.04

Brighten up your DTP documents with Midnight Graphics Clip Art Set 1 - Over 480 high quality images for only £29.95

Master 128

Master 128 ..... £369

Books (No Vat)

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Archimedes Assembly Language £14.95
Archimedes Operating System £14.95
The above books have accompanying discs add £5 for 5.25", £7 for 3.5"
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RISCOS PRM's £79.00
Acorn DTP Advanced U.G. £14.95
BBC Basic Guide (Acorn) £19.95
Master 128 Ref. Man.Pts 1&2 .. (ea.) £14.95
A3000 Technical Guide £29.95
A540 Technical Guide £29.95
New Advanced User Guide..... £19.95
Additional Arc Software Manuals (Acornsoft)
First Word Plus, DTP, Assembler . (ea.) £10
ANSI C Version 3 ..... £19

Standard Monitors

Acorn Colour..... £199
Philips CM8833 .....£209
Philips Mono (Green) £75
Philips Mono (Amber) £79

All monitors come with free lead. State type of computer when ordering.

Multiscan Monitors

EIZO 9060SZ Flexiscan £449
EIZO 9070SZ Flexiscan ^ £675
Taxan 770+ LR Multivision . £425
Taxan 795 Multivision ^ **.... £495
Taxan Viking II Mode 23 ..... £799

^ comes with free VIDC enhancer.

** monitor has 0.26 dot pitch and Sony Trinitron tube.

Software

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confirm Acorn's continued lead in educational computing," said education sales and marketing manager Chris Humphries.

"We are actually growing our market share and reinforcing our position as the number one supplier of computers to UK schools. As 1991 continues, it is going to be even better".

Software sales up

THE demand for educational software continues to grow despite economic recession. Following their appearance at the recent BETT Show, ESM (0223 460557) have announced record orders – 68 per cent up on the previous year. Latest offering from ESM is Desktop Folio, their word processor and DTP package for Archimedes and BBC A3000 machines.

Plotting on film

THE latest high-speed plotter from Linear Graphics (0686 629292) is the Plotmate Plus XY-750 which will work on either paper or film. It includes an automatic change facility with eight pens, automatic pen capping, variable pen pressure and a soft-landing mechanism which extends pen life.

For use with BBC Micros and Archimedes machines, it is compatible with the industry standard Hewlett-Packard Graphics Language which includes most graphics plotter support software.

Particularly aimed at the education market, Plotmate Plus XY- 750 has a standard price of £599 but costs £549 under Linear Graphics' special voucher scheme.

Also developed for education is the Plotmate A3M Multipen which features an upwardly rotating arm allowing many different media to be used on the drawing platen.

This makes it a creative classroom device in addition to its basic function as a 10 pen flatbed plotter.

Applications include designing printed circuit boards by plotting direct on to copper board with etch resist pens and plotting on to plastic sheeting and thick card for packaging.

The standard penholder can be replaced with a modular version which takes pens up to 12mm in diameter and even T shirts can be designed using heat transfer pens.

Plotmate A3M Multipen costs £499 or £399 on the special voucher scheme. Vouchers are sent out with Linear Graphics' sales literature and price lists. A starter pack of the necessary software costs £45.

Who's who at Shopper Show

MARKET Research carried out at the latest Computer Shopper Show reveals that 24 per cent of the 37,600 visitors were either existing Acorn users or intended to buy Acorn machines.

Most interest was shown in the BBC A3000 which along with the Archimedes secured the attention of 13 per cent of visitors. A further 11 per cent were there for BBC Micro and Master products.

This year sees two Computer Shopper Shows with a spring event being added to the traditioanl pre-Christmas exhibition. It takes over Alexandra Palace from May 10 to 12 and among the Acorn names already booked are Care Electronics, Dab Hand Computing, Fourth Dimension, Ian Copestake Software and PRES.

"The wave of interest in Acorn machines shown at the December show is going to be mirrored by Spring Computer Shopper", said Stephen Bozdan, marketing director for show organisers Blenheim Dateabase Exhibitions.

A way with notes

BUDDING composers who use a BBC Micro can now see their pieces come to life with the help of Hybrid Music Publisher from Hybrid Technology (0223 420360).

This new package is claimed to do for printed music what the wordprocessor does for text, allowing it to be entered, edited, stored and printed in a variety of formats.

Score layout is handled automatically with Music Publisher taking care of such intricacies as stem direction, part alignment and beamed groupings. Composers can enter music even quicker than handwriting it using a series of simple codes for the music symbols.

Price, £60 plus VAT.

Share a hard disc at school

UP to eight Archimedes or BBC A3000 machines can now share one hard disc through the Nexus system from SJ Research (0223 461406). Although it's not a replacement for Econet, it complements such a system and is a new storage solution which is already receiving top marks in schools.

The rugged base unit is a four port server which can accommodate either a 40 or 70Mb hard disc, and two expander boards are available bringing the capacity up to six or eight machines.

Each computer needs an interface card which fits into the standard internal expansion, but even with these and the necessary cabling, the cost is still less than the equivalent number of individual hard discs.

Nexus offers quicker loading times than Econet and frees the network from loading Archimedes applications. It incorporates a keyswitch for security and can be locked away to avoid accidental damage on a desktop.

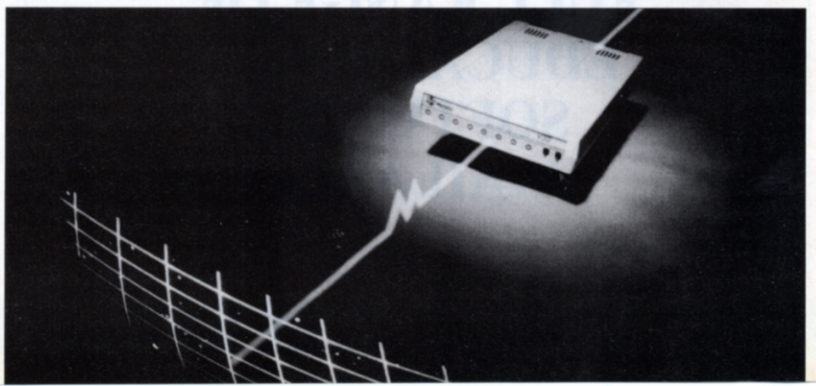
Because of its flexibility it is currently used in a number of schools with different layouts and requirements.

These include Bryanston School in Dorset where it is used with eight machines in

Mercury modem speeds transmission

A NEW modem is now on the market for subscribers to the Mercury telephone system. The Mercury V.32 offers the speed of the V.32 standard and incorporates the latest V.42bis data compression.

It has a Mercury network access facility aimed at offering higher quality transmission at lower costs and costs £895 plus VAT. A V.22bis version is also available for £495.



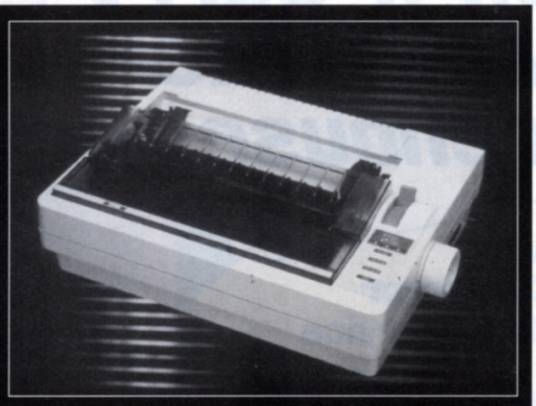
the technology department; Pontarddulais Comprehensive in West Glamorgan which has three systems and Dolphin Primary School in Berkshire where it is used mainly for storing word processing applications.

A four port Nexus unit costs £1,240 with each interface card costing £59 and cabling £60 – a total cost of £1,536 for a four machine system and a cost per workstation of 384. An eight machine system costs £2,332.

Pushing 24 pins

CITIZEN (0895 72621) have cut the price of their award-winning 24 pin printer, the entry level 124D, by 11 per cent. It drops in price from £279 to £249.

General European sales manager for Citizen Richard Scotto says the cuts are part of a move to convert nine pin printer users to 24 pin machines.



Argos goes for the BBC A3000

ACORN looks set for a home user boost to its sales of the BBC A3000 Learning Curve package with the news that it now appears in that Bible of the avid shopper, the Argos catalogue.

The only computer-based educational package of its kind to be stocked by the giant chain, the A3000 is being sold through the group's 25 larger superstores.

Retailing at £1,085 complete with 14 inch monitor and accompanying software, the BBC A3000 merits a larger than normal entry in the computer and video games section of the latest catalogue.

Other new goods making their first appearance in the Argos catalogue are Nintendo's Gameboy and the Psion MC200 oraniser. Argos has recently dropped the Atari Lynx and Atari Portfolio.

The A3000 already appears in Littlewoods and Great Universal Stores catalogues.

Wide range Arc WP

DEVELOPED in association with Acorn and designed specifically to work with Risc OS, EasiWriter is the latest full-featured Archimedes wordprocessor from Icon Technology (0533 546225).

In addition to being used as a basic wordprocessor for writing short documents, it can produce correspondence, multi-column reports or even complete books including graphics created with other Archimedes applications.

Built-in page layout incorporates up to nine columns with automatic text balancing. Other features include a table editor, structure editor, spelling and hyphenation and a zoom facility which allows magnification from 10 per cent to 999 per cent.

With all the features of EasiWriter, a more specialised version is TechWriter which includes a fully integrated equation editor. Using the rules of mathematical typesetting, it makes even the most complicated equations and formulae easy to deal with and is fully wysiwyg with formulae appearing on screen just as they will be printed out.

EasiWriter costs £150 plus VAT and TechWriter £250 plus VAT.

Cheerfully to work

CHEAP, cheerful and easy to use, is the claim for DrawBender, one of the latest Archimedes products from Ian Copestake Software (051-648 6287). Allowing users to manipulate text or any draw path object form, it is a cheaper alternative to Poster and a good partner for FontFX.

DrawBender alone costs £10 or £12 with a set of three decorative fonts.

"We are planning to bring out other products as a sequel to Drawbender", said Ian Copestake. "We are looking at FontFX and Poster and can see various ways in which we think they can be improved".

Also among the company's latest products is PipeDriver Dot 1 for users whose dot matrix printers are not fully served by PipeDream.

It provides access to resident and download fonts, ink colours, variable print size and line spacing and follows on from First Fonts for 1st Word Plus and Power Fonts for Wordpower.

A lot quicker than full DTP, PipeDriver Dot 1 makes foreign language and scientific wordprocessing much easier and costs £10.

Ian Copestake is currently working on a new range of expansion products which will go under the heading of Oddules.

First off the line will be AnDi Oddule, an analogue/digital convertor which has a target price of £49.

Ninja II joins Sam

STEVE Hanson of Superior Software (0652 58585) has revealed the contents of Play It Again Sam 15 exclusively to *The Micro User*, and a cracking compilation it will be.

Star game will be Last Ninja II, the Superior hit full of fiendish adversaries and set in downtown New York where the challenge is to destroy the evil Kunitoki.

Running it a close second will be Ricochet, the massive arcade adventure launched a year ago with 330 different screens spread over five levels.

Written by Peter Scott, the Pandemonium-style game Network is the third title in Sam 15, which will be rounded off by Cyborg Warriors, the sideways scrolling shoot-em-up from Quest author Tony Oakden.

"We hope to have Sam 15 out after Easter", said Steve. "It will be on the usual formats, BBC, Electron and Master Compact, but we have not yet fixed the price. This is

➤

Wide range scanner

ONE of the few scanners specifically designed for the Archimedes, the new i-Scan from Irlam Instruments (0784 451192), can deal with documents from postage stamp size up to A4 width.

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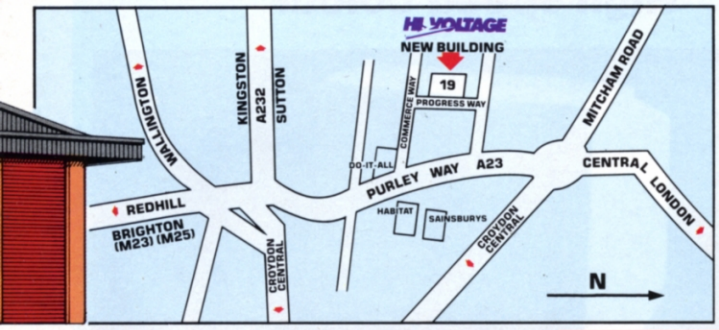

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because of the size of Ricochet which could go on to three discs".

Also new from Superior is Archimedes Speech, a new version of their old speech generator for the BBC Micro.

"The basic program is written and sounds very good", said Steve. "It's now a matter of sorting out the vocabulary which is time consuming, but we hope to have it out by Easter".

A multi-tasking package, Archimedes Speech will have a much lower price point than other similar utilities. It will cost £19.95.

"We can achieve this price by selling to a lot of people who would not normally buy a utility of this kind but who think it is fun to add speech to their computer", said Steve.

Built into Masterbreak, Superior's quiz game based on snooker, is the option for extra questions, and later this year Superior may be selling extra sets at under £10

The original program includes 2,100 questions, of which 80 per cent are text based and 20 per cent graphic and sound based.

"This could turn Masterbreak into a useful education program. There is nothing to stop specific sets of questions being produced for particular education needs", added Steve.

"If, for an example, primary schools wanted questions based on graphics, extra discs could be added with up to 500 questions. If extra sets are purely text based they could include more than 2,000 questions.

"This makes Masterbreak a very flexible program and is something we did not publicise until after the launch".

High speed colour

ARCHIMEDES and BBC A3000 owners can now use their machines to capture full colour pictures in nine seconds with a complete kit launched by Solitaire (0480 495608).

The kit includes a lightweight Canon Ion still video camera which does away with the need for film by using a mini video floppy disc. No processing is required and images can be seen on the computer screen in seconds.

Up to 50 pictures can be stored on the disc and each can be erased so the disc can be used many times.

Also included is a professional standard, full colour frame grabber which takes the video image from the camera and translates it into an array of 640 x 256 resolution digitising it directly into the computer's own memory at 24 bits per pixel offering a range of more than 16 million colours.

Images are stored in sprite form with 256 colours from a palette of 4096 so they are immediately usable with other Archimedes applications. They can also be captured in 256 grey scale mono in just three seconds.

Aimed at industry, business, science and education, the Archimedes Picture Kit comes with a number of accessories for £1,250 plus VAT. It runs with Archimedes 300 and 400 machines in addition to the A3000.

Arc awaits emulator

ARCHIMEDES owners who eagerly anticipate being able to play Spectrum games on their machines have about two months to wait. That's the latest news on Speculator, the Spectrum emulator for the Archimedes from Arxe Systems (081-534 1198).

At the centre of the hold-up is the Spectrum's rom operating system developed by Nine Tiles of Cambridge and the subject of confusion over royalties when it was originally used by Sinclair and subsequently taken over by Amstrad.

After requesting use of the rom, Onkar Jagpal of Arxe says he received a flat refusal from Amstrad together with a warning over the legal consequences if he did.

"We are in contact with Spectrum and Amstrad user groups, but it looks as though we will have to release Speculator without the rom", said Sherena Pennington at Arxe.

"Users will have to get hold of a Spectrum and copy the rom themselves. It will take about two months for us to sort this out".

An Amstrad spokesman told *The Micro User*: "There is no question of copyright infringement here. So far as Arxe are concerned, they are on pretty safe ground.

"Amstrad's stance on matters such as this is pretty relaxed".

Art for the Arc

A SET of 350 clip art images for the Archimedes and BBC A3000 come from Orion Computers of Preston (0772 623000).

Ranging from cartoons to transport, the comprehensive selection is on four discs and costs £19.95 excluding VAT.

The company have released a Archimedes/BBC A3000 TV modulator incorporating the sound channel so users can plug their micro into a standard TV. The unit costs £65 ,or £49 if bought with a 32 bit Acorn machine.

Second impressions are best

Bruce Goatly gives a DTP package the twice-over

WHEN Impression first appeared in late 1989 – it was reviewed in *The Micro User*, January 1990 – it showed promise as the leading desktop publishing package for the Archimedes. Now version two has arrived, bearing even more desirable features. But have they put it ahead of the field?

As it is based on Impression version 1, I need only concentrate on what has been added. The package itself is much as before, with a ring-bound manual – totally new and 300 pages long – a dongle and a copy of the book DTP at a Glance.

There are now five discs instead of four, the extra one containing a selection of additional frame borders, sprites and !Draw files to enliven your documents, as well as software extensions for loading text files prepared in alien formats and also for draft printing. Fonts provided are now Character (bit-mapped and very clear on screen), Greek, Dingbats (symbols) and Pembroke, a Palatino equivalent, as well as Acorn's standard Corpus, Homerton and Trinity.

The software contains many new facilities as well as various fixes for earlier bugs and features. I shall list only the major changes as there isn't space here for them all.

One of the drawbacks of version 1 was that all text attribute changes had to be defined through styles, even if some were needed only once in a document. Version 2 overcomes this by having a new item on the main menu: Effect. So if, for instance, you want to change to a different font on a few occasions, the quickest way is via the Effect submenu. You need to remember that effects are local to where they are applied, and have to be adjusted individually if you change your mind later. But that is a small price to pay for the convenience.

In a new area of the Style submenu are ruler options to apply tabs and margins to your text by defining named rulers. You can now also conveniently place margins and tabs by typing exact values as well as by sliding icons on the ruler. The operation of rulers is global like styles, rather than local like effects.

All the strengths and flexibility inherent in Impression's original style system have been retained, and now that text formats are listed as effects there is no need to define a style for each one.

Menus now show the relevant key shortcuts, making them much easier to learn. A possible criticism is that they also make for more clutter, but perhaps in future versions we could be given the choice whether or not shortcuts are shown.

In principle this is possible now because all the menu and dialogue texts are in a text resource file which you can alter with !Edit, but it would be tedious for all the menus.

A new Preferences dialogue box gives greater control over the start-up options. Among the new selectable features are access to on-screen page rulers, making positioning items on the page very much easier, and a flashing cursor which stands out better.

A major addition is the enhanced graphics option, which permits graphics – sprites as well as !Draw files – to be rotated in real time on screen. If you've ever tried rotating a sprite with !Paint you'll be amazed at Impression's speed. Graphics can also be panned around within their frames simply by dragging.

Frames have been augmented in several ways. First is the ability to group frames, either temporarily so that they can be moved, resized or copied together, or permanently so that multi-element illustrations can be assembled with their captions and treated as a single entity.

Version two now has a new frame type, the repeating frame, which to some extent takes the place of master frames. As its name suggests, a repeating frame placed on a page will be repeated on all subsequent pages. This is very useful for page headings in a book, for instance, because the frame's contents can be changed chapter by chapter.

Frames can be made to repel text inside as well as outside, with independent control of horizontal and vertical repulsion of the internal text. Border selection is easier and more versatile, and additional borders can be designed using !Draw and then imported into Impression.

Another improvement to frames allows the selection of successive individual ones in a stack. This means that even a completely buried frame can be selected.

Finally, arrows can be brought forth to show the flow of text through linked frames. frames.

Text handling has not escaped attention, though the editing controls are virtually ➤

Product: Impression 2
Price: £194.25
Supplier: Computer Concepts Ltd,
Gaddesden Place, Hemel Hempstead,
Herts. HP2 6EX
Tel: 0442 63933
Requirements: Archimedes or BBC A3000

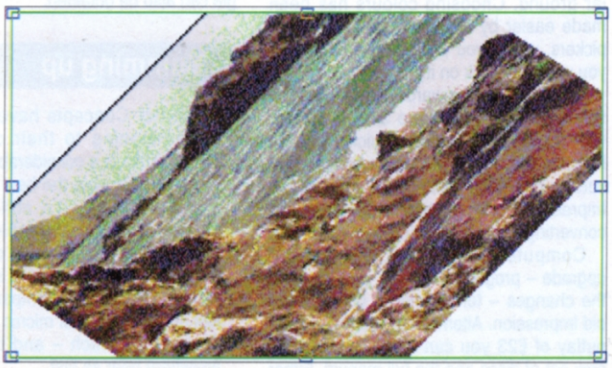

Figure I: Even large sprites can be rotated quickly

unchanged from version one – and some of these originated with Wordwise.

Several new features make for a more professional finished appearance. A text gridlock system has been devised for the benefit of multi-column work which forces text to line up horizontally across the page. A *keep together* option prevents headings from appearing at the foot of the page. This is fairly useful, but it still can't prevent widows or orphans – those lonely part-lines at the top or bottom of a column.

The hyphenation system has been improved by the addition of a soft hyphen facility which lets you specify where a word should break if required; if it isn't, the hyphen is omitted. For tabular work you can now use a leadering string of up to four characters, not just one.

A handy enhancement is a text overflow indicator, a red arrow which warns you if an unlinked frame is too small for the story in it.

Imported text can now contain complete style definitions, so you can set up detailed document specifications while preparing your text, as long as you know exactly what you are doing. However, a style already defined in the receiving document will not be redefined by one of the same name in the imported text.

The font menu has been given a hierarchical structure, which cuts down the number of choices appearing at a time. Once you've acquired a large number of fonts you'll appreciate this.

The master pages have been rearranged in a more logical order and include some containing only guide frames. Chapters defined with facing pairs of master pages can now start on a left or a right page.

Automatic insertion of chapter numbers is now supported, in addition to that of page numbers, though the formatting of automatically inserted numbers is still a problem.

File saving has been changed to conform more with Acorn guidelines – the last-used document name is remembered. Ctrl-F3 brings up a dialogue box whereas before it saved to the original document name, so you have to remember to press Return too.

If you prefer, the document name can be changed at this point. Automatic timed saving might be a useful addition. Also a helpful asterisk is now added to a document's title bar to indicate it has been modified.

The print options have been made even more extensive, allowing the production of multiple copies of the same page on a sheet, plus the ability to ignore the page borders so as to achieve the largest scale possible and to print a mirror image page.

The print borders are now shown correctly, depending on the rotation and scaling specified in the print dialogue box. Draft printing is more intuitive, using a printer module rather than a save module.

Figure I.1 Different representations of a letter: (a) outline; (b) small on screen, much enlarged; (c) larger on screen; (d) as printed out

Figure II: Multiple frames grouped to form one complex illustration

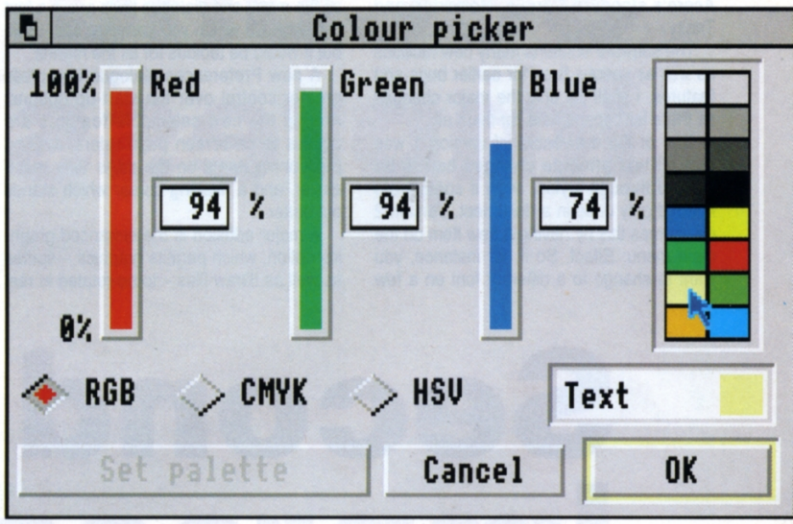

Figure III: A colour picker in use

Almost all the dialogue boxes have been changed, though they mostly build on familiar ground. Choosing colours has been made easier by the introduction of colour pickers, where you can point at the colour you want and click on it.

Impression 2 is upwards compatible from version one, so if you are already familiar with the original you can quickly get the hang of the new one. It also means that version one documents can be loaded into Impression 2, though there is still a problem converting of the main heading style.

Computer Concepts offers a free upgrade – program disc only, plus notes of the changes – for registered users of the old Impression. Alternatively, for the modest outlay of £23 you can obtain a complete new set of discs and the full manual. Either way, if you have version 1 you have no reason to miss out on the new facilities. Site licences are available at extra cost and a network version that doesn't require a dongle can also be obtained.

Summing up

Computer Concepts have evidently been listening to their customers because this is a considerable improvement on what was the best DTP package of its time. It's still the most comprehensive available for the Archimedes, and although dearer than the others you should bear in mind that DTP programs with comparable facilities on other types of micros cost several times as much – and they aren't anywhere near as fast.

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(RISC OS) New

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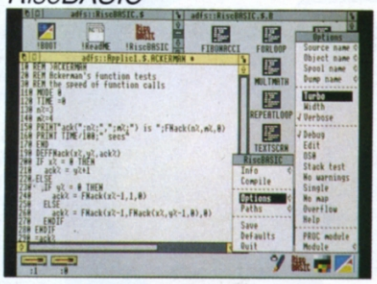

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"In summary, BASIC V is the best version of BASIC produced and RiscBASIC provides the most compatible, fastest compiler for this language. This will be an invaluable addition to every serious BASIC programmer's toolkit. My congratulations to Silicon Vision" - Archive June 1989.
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(RISC OS) New

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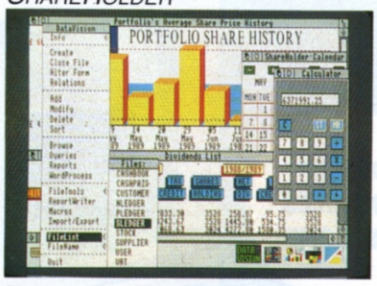

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(RISC OS) New

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UPDATE

Schools turn to colour

HUNDREDS of UK schools have now upgraded their computer activities into the colour printing arena and more are set to follow. Top printer company Citizen (0895 72621) reports soaring sales for its colour driver designed to work with the Archimedes range of computers.

Launched in 1990 as the first colour driver on the market for Acorn computers, the Citizen driver has already sold heavily into many educational authorities including North Yorkshire, Lincolnshire, Nottinghamshire, Barnsley and Manchester.

With many more authorities poised to make purchases, Citizen predict they will exceed their annual sales target of 1500 units.

"This steep sales incline is expected to increase dramatically throughout 1991 as educational establishments demand equal printing capabilities to those of the professional world", said a Citizen spokesman.

Citizen's colour is doing well

Environmental database

THE future of our planet is in the hands of today's schoolchildren and environmental awareness is fast becoming one of the main growth areas in education. While a lot of ecological information is available many teachers find that it is not in an a readily useable form.

Computers are an ideal tool for teaching pupils the importance of green issues and Living Earth is a registered charity committed to producing innovative educational programs on environmental matters.

Although it has been in existence for three years, Living Earth is still in an embryonic stage and is now poised to launch its first computer product for Acorn machines, a Rainforest Database for BBC A3000 and Archimedes 440 computers.

"Living Earth is founded on the belief that education is vital to the future of the planet", said the charity's Liz Walker. "We aim to produce serious, high-quality educational applications as part of the National Curriculum so children will become more caring on environmental issues.

"Environmental matters are now a cross-curricular subject. There is a dearth of materials for teachers but there is a lot of information around. We want to put it in the right format for teachers to be able to use in their classrooms.

A non-profit making organisation, Living Earth is sponsored by industry and is currently attracting an increasing number of "blue chip" names. Its educational products are the result of workshops where teachers and educationalists have direct input into development.

Mobil, Acorn and Apple are just some of the companies supporting the charity and the Rainforest Database is part of its schools programme - the result of a survey of secondary schools funded by Midland Bank as part of the Rainforest Education Programme.

The database has two levels making it suitable for both primary and secondary schools. It includes a set of data discs and a program disc. The program disc includes an editing facility which allows students or teachers to add their own information and compile their own reports. An updating facility also allows new data to be included on a regular basis.

Data is organised under four main categories: Ecology of rainforests, use of forests, people and deforestation issues. These are further divided into sub-headings which include a wealth of facts, figures, case histories, excerpts from books, diagrams, photographs, first-hand accounts and maps. It also includes support materials and a wall chart with a map of the database.

Living Earth deals directly with 3,000 UK schools but any not on their list can contact them by writing to 10 Upper Grosvenor Street, London W1X 9PA or ringing 071-499 0853.

As *The Micro User* went to press, Living Earth was taking names and addresses of schools wanting the Rainforest Database which was nearing completion. The price had not been fixed but should be between £30 and £50.

"Our aim is to produce information which would be included in a large number of books in a readily accessible form and for the cost of one large book", added Living Earth's Niall Marriott. "This is our first computer program and is uncharted waters for us. In future we hope to cover other topics such as the marine environment and climates. Our aim will be to respond quickly to the changing needs of education".

Landmarks launched

EDUCATIONAL specialist Longman Logotron (0223 323656) has released the first two titles in its Landmarks series. Landmarks Egypt and Landmarks Second World War are Archimedes programs produced in conjunction with the BBC for its current Landmarks schools television programmes.

The end of March should see two more titles being launched covering rainforests and the Victorians.

Through each of the programs, pupils ➤

communicate with children from other lands or other times. An Egyptian child leads them through his world answering their questions and helping them unlock historical facts while a similar format introduces them to a Somerset village in the Second World War.

In both programs, dialogue is through the keyboard using natural language with more than 800 words recognised and responded to by the system.

In the rainforests program, pupils will be able to communicate with forest dweller Betuni who shows them round her world and their contact with the Victorian age will be a boy called Ernest who takes them for a ride in his pony and trap.

The Landmarks programs cost £19.

Also new from Longman Logotron is Concept Designer, a utility program developed in conjunction with the Concept Keyboard Company and The National Council For Educational Technology. It allows users to create and use overlays on a Concept Keyboard and works with most programs which run under Risc OS on Archimedes computers.

"We have worked with a number of developers to create a standard file format which we hope will be adopted by software publishers in order to have greater compatibility between programs which can exploit the Concept Keyboard", said Tina Detheridge of NCET.

Concept Designer comes complete with a program called TouchData, a similar package to the Touch Explorer Plus originally developed for BBC Micros. Also included is SoftTouch which emulates the action of a Concept Keyboard on screen even when one is not attached. The package costs £24.

The new Landmark packs provide a wealth of data

Adventurous chemistry

LEARNING should be fun and Pre-Emptor (0752 601164) has used this principle to the full with its latest program, Espionage, a package which enlists undercover agents and spies to teach organic chemistry.

It's an educational adventure game based on the oil industry. The aim is to teach and test the pupil's chemistry knowledge but an added bonus is the adventure factor. The pupil plays an undercover agent seeking out a mole who is leaking company secrets.

Available on disc or cassette for BBC Micros and Archimedes machines, Espionage costs £8.95.

Designs on the curriculum

FOLLOWING their recent amalgamation, Oak Software and Software Solutions are now trading under the name of Oak Solutions (0532 502615) and have just announced their first launch.

The company's Design Processor is the initial program in its Foundation Series of Archimedes packages, each designed to address a specific area of the National Curriculum.

It gives pupils a series of information databases and software applications for use in Design and Technology courses. Beginners can follow a line of inquiry page by page while more experienced pupils can leapfrog to their particular area of interest.

The Design Processor includes a 3D visualisation program which allows constructions to be built, rotated and viewed from any chosen angle plus a 2D draughting program for CAD. As *The Micro User* went to press the price had not been fixed.

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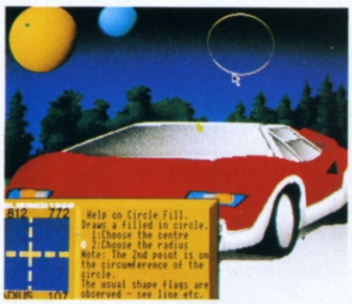

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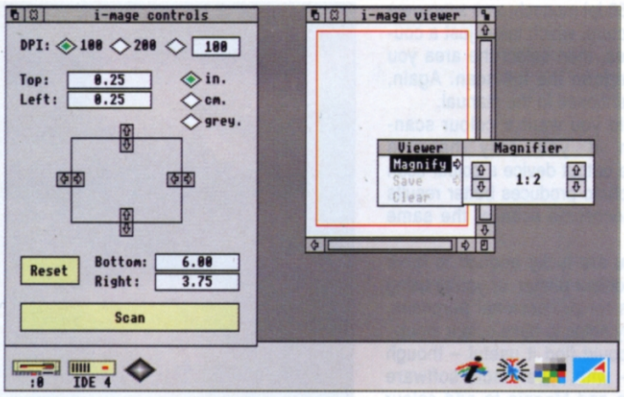

I-image has simple controls

Mike Goldberg's cat from the original artwork

Over the DTP rainbow

Steve Turnbull checks out an Archimedes colour scanner

Product: i-mage
Price: £599
Supplier: Irlam Instruments Ltd., 133 London Road, Staines, Middx, TW18 4HN.
Tel: 0784 451192
Requirements: BBC A3000 or Archimedes, at least 2Mb ram and hard drive recommended.

ANYONE delving into DTP soon realises they need some method of getting pictures into their machine, and that usually calls for a scanner, of which there are two on the market.

Now any step into real DTP calls for a colour scanner, and i-mage from Irlam fills this need.

What you get is the scanner itself – the popular Sharp JX-100 – its chunky transformer, manual, an expansion card for interfacing to the machine, a disc of software and the 20 page i-mage manual.

The Sharp JX-100 has a physical resolution of 200dpi but can process it internally to give any ratio from 50 to 400dpi. The i-mage software only lets you use a range of 50 to 250dpi, which is fine for most purposes and I only ever found a need for 50, 100 and 200 settings.

The scanner returns a maximum of 24 bit colour information – 256 levels of red, 256 levels of green and 256 levels of blue. Other options allow eight colour data – the same as the 8 bit BBC Micro – 256 grey scale or simple monochrome. Of these the software only allows 24 bit colour and the grey scale to be selected.

The unit itself is about 30cm long, 15cm wide and 4cm deep and one end contains a 17x11cm window through which you can see the area that you're going to scan and the scanning head as it moves back and forth.

Operation is simple – you place the scanner on to the item you want to scan and click the go button.

You have to be very careful how you place the scanner to make sure your verticals are really vertical. The picture of the Protext 5 box in the March issue was produced by two scans which were then joined together using !Paint.

If you look carefully you can see some interference in the horizontal lines and if you try very hard you can actually see the join.

Doing a full size 200dpi colour scan takes about 15 minutes, during which

➤

time the head makes three passes across the subject. The result is a 770k, 256 colour, Mode 21 sprite which can be saved in the usual way. However there is an intermediate 24 bit colour file which is three times the size – 2.3Mb.

I-mage creates the 24 bit file then runs the famous ChangeFSI software to convert it to Archimedes sprite format.

ChangeFSI is partially written in Basic and will try to dimension an area of memory the size of the sprite it's going to produce. If there's insufficient memory remaining it can't do it.

Clearly it's not really practical to use the scanner with anything less than 2Mb of ram and even then you may have to resort to various tricks if you want a full size 200dpi scan.

The first ploy is to use the Task Manager to adjust the *Next* setting to the maximum memory available. If this fails you must kill i-mage and run ChangeFSI from the command line. Unfortunately I had to work all this out for myself, as it's not in the manual.

In many cases you won't want to use the whole scan area, but it's difficult to use the on-screen adjuster when you don't know exactly where each part of the image will appear. What's needed here is to do a fast 50dpi monochrome scan over the whole picture, which takes just a couple of minutes, then select the area you want and perform the full scan. Again, this is not mentioned in the manual.

Why would you want a colour scanner? Even if you only have a monochrome output device a colour scan of a colour photo produces better results than a monochrome scan of the same picture.

And if you are lucky enough to have access to a colour printer, or you're using your system for professional purposes, then it clearly helps to have colour input.

Schools could find it useful – though expensive – with hypermedia software like Genesis and Magpie to add colour pictures to the pages.

Summing up

I-mage is very easy to use and produces very good quality pictures through ChangeFSI. The main limitation is Risc OS itself, which doesn't have a facility for 24 bit colour sprites. The cost may seem high, but is on a par with the same unit for other machines – and the software is very much easier to use.

The colour recognition ie excellent

We would like to acknowledge the assistance of Ian Copestake Software for providing their hard disc system for this review.

The economical and practical design of the City Desk Workstation removes the systems hardware from the desk surface providing optimum use of available space. Its many design features are suited to home or office use.

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Requirements: BBC A3000 or Archimedes

Rog Frost unlocks the latest version of a tried and tested database

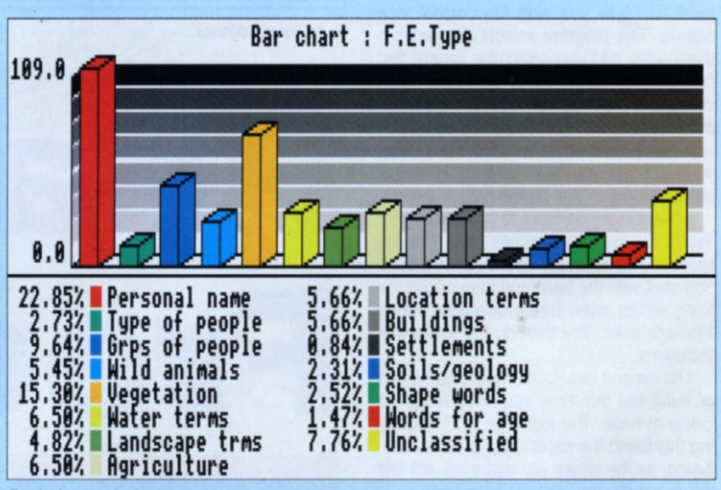
ANGLIA Television's Key database is already well known in schools. It is a cheap, simple to use, record card style program with very good support in terms of ready produced data files. Keyplus is a new version, designed specifically for the Archimedes.

The first problem to overcome is loading. The manual tells you to catalogue a disc which contains !System first. In fact what was needed was to access the !System folder and load the Colour module within it. This certainly shouldn't be necessary. Once loaded, an appropriate icon sits on the icon bar. This can be either the search or the edit program on a 1Mb machine.

Clicking the mouse Select button on the icon makes Keyplus operate like its old style 8 bit ancestor but in Mode 15. An initial menu screen gives the familiar options to Search, Sort, Create or Amend. Selecting one of these brings up a request for a pathname. This reduced me to a gibbering wreck. I tried every idea I could think of but all were rejected as bad pathnames. The very poor manual gave no help. This took me back to my more familiar method of operating – using Risc OS.

To use the program this way, a directory containing a Keyplus database is dragged on to the icon. From here it is a doddle to carry out all of the basic database functions. Anyone familiar with standard Archimedes applications will feel at home.

In addition to standard searching and sorting, there is a comprehensive graph capability. Bar and pie charts and line graphs are all possible. These make good use of colour and can be saved either as full screen sprites or at a reduced size.



Producing graphs is easy

Values can be given as percentages or as actual numbers. Printing is via standard Risc OS printer drivers and if you can print !Draw or !Edit files you can print these graphs.

The program also copes with statistics from calculating means, medians, modes and field totals through to Spearmans R and Chi Squared.

Keyplus has a very good map system. An example file on the disc is concerned with place names in East Anglia. This includes maps of the area and it is possible to plot, for example, those places where the name has an Old English origin.

It is also possible to select places directly from the map and so search for specific information. These maps are standard sprites and could be created or edited using !Paint.

With a program aimed particularly at the school market, support is essential and one section in that most inadequate manual deals with converting existing BBC files to Archimedes format. This involves the usual problems associated with converting files on 5.25in DFS discs to a 3.5in ADFS system.

If you can manage that bit, there is a convert utility which attempts to get maximum effect from the Archimedes. Anglia have promised new materials to work with Keyplus, and this seems the way forward.

A bonus for the well equipped is that Keyplus can be used to control the Domesday Video disc system though this requires a Genlock board to be fitted to the computer

Summing up

Keyplus is a real Jeckyl and Hyde performer. It is awkward to load, badly explained and difficult to use in the original format. Once loaded, though, it is a superb Risc OS application with many excellent facilities. Definitely worth considering.

Ready, Freddy, Go!

Marshall Anderson gets on his marks with a conversion of an educational package

FREDDY Teddy from Topologika is their second package based on programs originally designed for the Nimbus by Northamptonshire Computer Education Centre. It is aimed at lower infants and provides three language-free activities looking at colour matching, visual discrimination and sequencing skills.

The first game has our hero on his skateboard rolling across the screen. Above him is a balloon with a coloured basket. The idea is to spot when the basket is the same colour as Freddy's jumper. Press a mouse button or spacebar when they match. If you get it right you'll get a nice sampled chuckle and Freddy flies off in the balloon.

Freddy's Factory is a place where you must fill glass jars with the correct size square. The program selects the jar from three sizes and you select the square that fits. The animation here is really nice with a conveyer belt, windy pipe, glass crusher for incorrect tries and Freddy pulling levers.

My only reservation is that the animation you get when you make an error is almost as interesting as that for the right answer.

In the bakery we have to make cakes for Teddy. There are two games here. The first involves copying three cakes one at a time. You start with the base and then put on the icing which must be coloured to match Freddy's cake. You then do the same with the cherry.

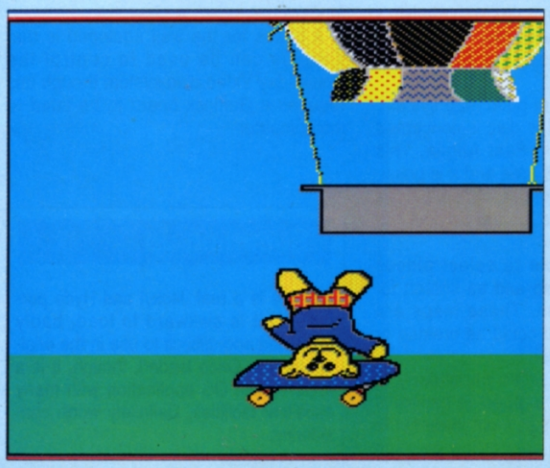
The second has you doing the same sort of thing but this time you have to do six cakes at once. The four year old I had trying this found the second game a little confusing, as the cakes you make are not laid out in exactly the way the cakes you must copy it's much more challenging.

Summing up

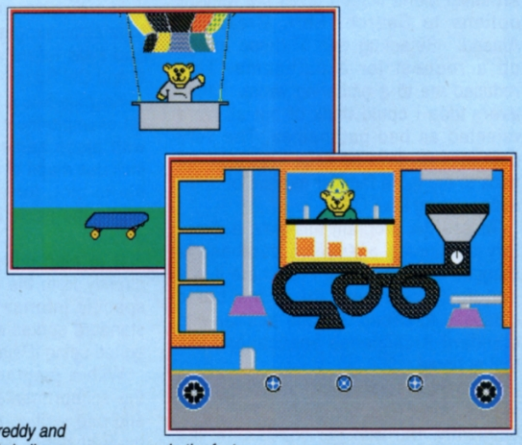
This is an excellent little package for early learners at home and in school. Children will be very entertained and educated by Freddy Teddy's antics.

A choice of programs

Product: Freddy Teddy
Price: £19.95
Supplier: Topologika, P.O. Box 39, Stilton, Peterborough PE7 3RL.
Tel: 0733 244682
Requirements: BBC A3000 or Archimedes



Freddy and his balloon



In the factory

Chess 3D

(requires RISC-OS and 1Mb memory)

"QUALITY ARCHIMEDES SOFTWARE FROM MICRO POWER – the Publishing House that brought you over 70 superb programs for the BBC Micro and over 40 for the Acorn Electron".

The Display. Single-screen presentation with superb 3D graphics, using shading and vanishing point perspective. Board rotation at any point in the game and additional icon-type board for quick moves. Moves and responses are listed in a window allowing review of the game so far.

Options include player v computer, player v player and even computer v computer. A book of standard openings is available, to which you may add if you wish. Learners can cheat by taking back moves or even reversing sides with the computer. A part game can be set up to aid analysis of particular problems.

The program is fully integrated with RISC-OS multi-tasking and windowing system. For instance, you can close down the main window after moving, work on some other application, and then return to find your chess game has been progressed.

As you would expect all moves are validated and the program accommodates Castling, 'En Passant' and all-piece promotion. Full advantage has been taken of the speed of the Archimedes.

TRIAL OFFER

Cut-down version of program (player v player only) available at £2.95 to enable you to experience the graphics. This is completely refundable against purchase of the full game.

AUTHORS

If you have written or are writing Archimedes software of commercial standard and are seeking a Publisher please write to Bob Simpson at the address given, preferably with a working sample of your program.

Cheques/P.O's payable to MICROPOWER

Micro Power Ltd. Northwood House, North Street, Leeds LS7 2AA Tel. 0532 458800

Price £19.95

Please add 0.95p for postage & packing.

Product: Toby at the Seaside
Price: £23.00
Supplier: Sherston Software, Swan Barton, Sherston, Malmesbury, Wiltshire SN16 0HL
Tel: 0666 840433
Requirements; BBC B, Master, Compact (State version required when ordering)

Watchout...

Sand, sea

THE quality of Sherston Software's previous educational offerings means that any new programs have a high standard to live up to. Toby at the seaside is one such development and it manages to maintain the expected level.

The software is written for use in infant and junior schools, so the user interface must be right if the product is to make any impact at all. Toby has been produced and tested in a variety of schools, and the feel and high quality of the software is probably due to a large extent to this vigorous testing ground.

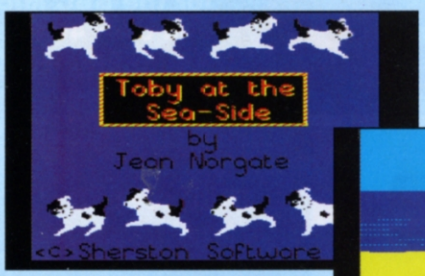
Toby is a suite of four programs, all based on the Punch and Judy dog. The main titles are Fun and Games, Judy's Shop, Ship Ahoy!, Rock Pools and Punch and Judy. Most of the games are for two players, but without any competitive element. Each of these topics give clear and concise instructions of how to use the particular activity chosen.

Fun and Games includes delightful animation of Toby the dog. You throw a stick and he goes to fetch it, but unfortunately finds five sticks and can't decide which is the right one. You have to help him in this simple shape matching game.

Then come writing names in the sand, followed by flying kites which covers adding, subtracting and comparisons.

There's more fun and games in the form of size matching buckets to sand castles, rebuilding broken down sand castles and observing reflections in water.

In **Judy's Shop** you and a friend have money to spend. The various stages involve seeing the cost of the items in the shop, counting money, choosing what to buy and paying for it. **Ship Ahoy**

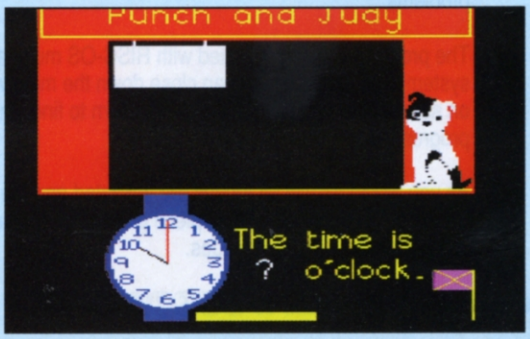


The title page

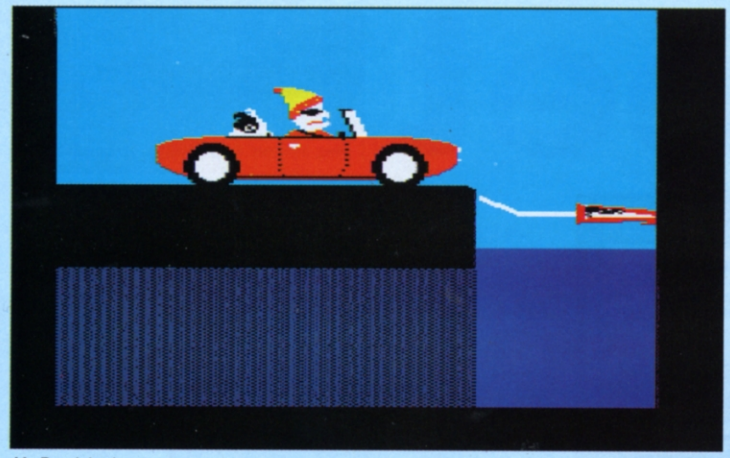
A stick-throwing exercise

What would you like?

Save the shrimp



Waiting for the show



Mr. Punch is about

and sky

Ian Dickinson checks out two new packages from Sherston Software

starts with a typically grumpy Mr. Punch driving violently into a road sign – a bit controversial but handled well. It then develops into an exercise in floating and sinking followed by loading the boat – a sliding block puzzle. There's a section on different types of boats and finally the flag alphabet, including the Blue Peter.

Rock Pools deals with moving shrimps around in pools while avoiding nasties. The final step involves separating the pool into sections with different types of creature in each.

The final part is **Punch and Judy** and the games here cover telling the time, putting letters in their correct places and a complete Punch and Judy show with the children acting as the audience and contributing to the show.

The package includes a children's booklet, teacher's book, work cards, games sheet and Concept Keyboard overlays, both A3 and A4. The teacher's book is a splendid example of how documentation should be written. It gives you everything you need to know about the package and details how it can be used related to subject and National Curriculum levels.

The start-up screen has an easy to use selection for teacher control – indicators are always available on the screen of what to do next. The software performs very well: A class of 11 year olds not only failed to crash the program, they enjoyed using it.

Summing up

If you want to involve children in topic work, making it interesting and enjoyable, this package will certainly be a step in the right direction.

Save the world

Product: Zillion
Price: £23.00
Supplier: Sherston Software ,Swan Barton, Sherston, Malmesbury, Wiltshire SN16 0HL
Tel: 0666 840433
Requirements: BBC B, Master, Compact

ZILLION is a science-based adventure program in which a group of children have won a trip to America and go to the Johnson Space Centre near Houston.

Their visit to Mission Control is not particularly exciting until Zillion arrives dramatically to destroy our world and it is left to the child heroes to save the day.

On booting the disc you are presented with several options. If this is the start of a new game, select this option and the opening story is shown and then on to the solar map. Games may be saved and re-loaded at a later stage.

The adventure is very enjoyable and although very "gamey" a variety of skills are required to succeed in it. Once on the solar map navigation is needed to get close to a planet and orbit it and the planet's name has to be entered correctly to get information about it.

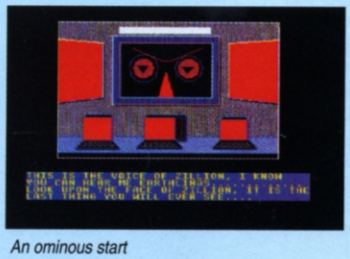
When the planets Curli, Lari and Mo are identified it is possible to land on them. Getting the spaceship close enough proved quite tricky.

Once landed, our intrepid heroes have a variety of tasks to accomplish involving a genetic accelerator, circuits and a snow maze. At the end of the quest the evil Zillion must be switched off by using a binary code.

Summing up

With lot's of excellent pictures and a sound educational base Zillion is worth having as part of the science software library, but must be carefully integrated with the overall strategy. A very useful program.

Arrival at the space centre

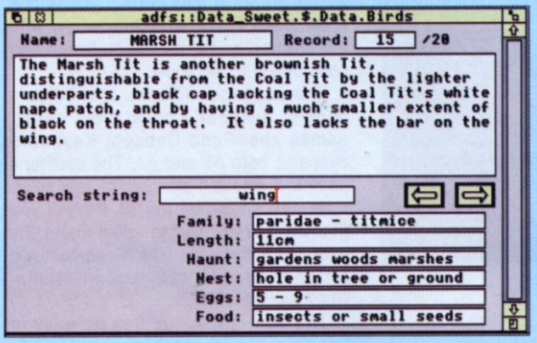


An ominous start

Sweet stuff

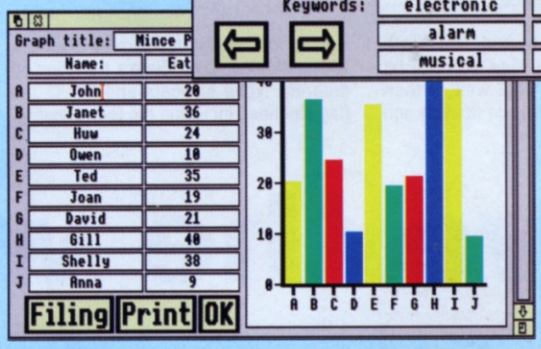
Product: Data Sweet
Price: £30
Supplier: Hampshire Microtechnology Centre, Connaught Lane, Portsmouth PO6 4SJ
Tel: 0705 378266
Requirements: BBC A3000 or Archimedes

John Clemence tries out a new suite of data handling programs



DataFind can search on any word

Keyword searches for DataCard



DataPlot is easy to use

IF you have been looking for data handling software which can be used on the Archimedes or BBC A3000 and which is either suitable for younger children or for introducing newcomers to the principles of data handling, Data Sweet may provide the solution.

It brings together five programs which are simple to use and can share and print data so that you can explore different ways of storing and representing similar material. The five programs in the suite are DataCard, DataFind, DataPlot, DataCalc and DataPick. They are supplied on one disc with comprehensive printed notes and suggestions.

DataCard and DataFind are index card packages. DataCard allows a heading for each card, eight lines of free flowing text and up to six key words. You can carry out searches on the card headings and need only a part – any part – of a heading, which the program will then attempt to match with all the cards.

Searches can also be carried out on the keywords. These are listed alphabetically in a separate window together with their frequency. Clicking on the desired keyword immediately finds the next card with that word. Click again and the search is repeated.

In place of keywords DataFind uses up to six fields which can be searched in three ways – by heading, by any word or part of a word which may be in the free text or from any field.

There are also facilities for multiple searching – for example using OR and AND – but not directly for sorting. However, any field can be shown and sorted graphically using the program DataPlot.

DataPlot allows you to draw a block, line, line bar or pie graph from up to ten headings and values. The program can be used directly by entering the data into the boxes on the screen. The graph is drawn as the data is entered and the program will allow you to use decimal entries as well as whole numbers. The program will also display information from other programs in the suite.

Any field from DataFind will be converted into a graph showing up to the 10 most common headings, so while DataFind has no facility for sorting, any field can be sorted by dropping it into DataPlot.

DataCalc is a simple spreadsheet with six columns and 20 rows. Data from two columns can be sent to DataPlot which is a nice feature, although it has some qualities which lead me to feel that it was not quite as well finished as the previous three.

For example, while working at the bottom of the sheet the headings for the columns are no longer visible, cells remain of fixed size so that the whole of a formula is not normally visible and toggling to a full size window results in not allowing you below line 18.

Finally we come to DataPick. This is very similar to DataCard but instead of keywords, sprites are used. This is a delightful idea but will be rather more complex for younger users and the less experienced to set up for themselves, since it involves using the Paint application from the application discs.

Summing up

This is a delightful and powerful set of programs which for the most part successfully allow new users to be introduced to data handling on the Archimedes. Despite some reservations about DataCalc and the usefulness of DataPick at this level, I would still suggest that primary schools should make sure that this is among their early acquisitions.

fun school 3

Learning is now even more fun!

Fun School 3 is everything you – and your children – ever wanted from educational software: **SIX** challenging programs in each pack which fulfil the exacting requirements of the National Curriculum. Plus: Stunning graphics; exciting sounds; carefully structured levels so your children can have fun and learn at their own pace. And all are designed by the winning team which created **Fun School 2**, the biggest-selling educational package ever!

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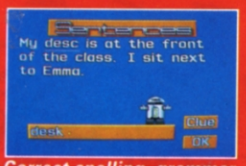

Correct spelling, grammar and punctuation mistakes

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Spectrum	9084	9085	9086	9087	9088	9089
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Software for the Archimedes

Equasor

An equation building tool that complements many RISC OS applications, in particular DTP and word processor programs such as Impression and Impression Junior

Many users of the Archimedes have a need to include complex mathematical formulae or equations into documents. Equasor allows equations to be built up on screen, graphically, from their component parts. Using the Acorn outline font system it presents a totally accurate view of the final equation at all times.

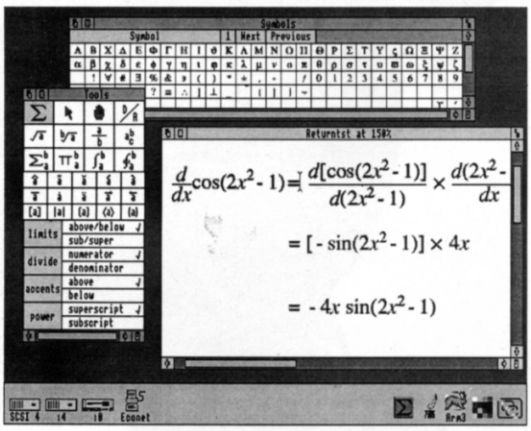
It simplifies the building of equations by presenting palettes of symbols, functions and operators which can be selected just by clicking with the mouse. It intelligently scales and re-sizes features such as summation symbols, brackets, and square roots as the equation is edited so they are always the right size.

Once the equation has been created it can be saved or exported as a Drawfile to any number of compatible RISC OS applications. In DTP packages it can be dropped into frames just like any other drawing where it can then be scaled and positioned as required.

When used in conjunction with Impression II, it can take advantage of the latter's embedded frame capability to embed equations into the text, even on the line. Once embedded in this way the equation will then flow with the text as part of the text.

Features:

Multi-tasking RISC OS application, can be run at the same time as other applications. Supports direct in-memory transfer of equations for the fastest, simplest integration with other RISC OS applications. Any number of equations can be handled at the same time. Equations can be viewed and edited at any scale. Saves equations as Drawfiles compatible with all applications that support this format. Supports multiple different RISC OS outline fonts and so is not limited to the Math/Greek font supplied.



- Supports region selection and cut, copy, paste between equations and documents.
- Styles for global control over fonts, size, spacing etc. of variables and operators. Effects give additional control over the appearance of individual parts of an equation.
- Small, compact program perfectly suitable for 1 Mbyte machines.

Included in package a 60 page spiral bound manual with detailed tutorial reference, and index. Discs include the program, example equations, and Math/Greek outline font.

£49.00+VAT *(£56.35 incl.)*

ShowPage

ShowPage is a PostScript compatible interpreter running under RISC OS. Over the last 6 years PostScript has established itself as an industry standard graphics programming language. Pioneered by Adobe for use in the original Apple laser printers it is now used in all manner of output devices such as colour printers, and typesetting machines.

ShowPage will be attractive to those wanting to learn and explore this programming language and those wanting to print and use PostScript files from other machines.

ShowPage is fully multi-tasking and RISC OS compatible. It can output any PostScript file either to a window on screen, or to the currently selected RISC OS printer. It can therefore be used to make even the lowest cost dot-matrix printer PostScript compatible. When used in conjunction with LaserDirect, it can turn this printer into a very fast and fully fledged PostScript compatible laser printer.

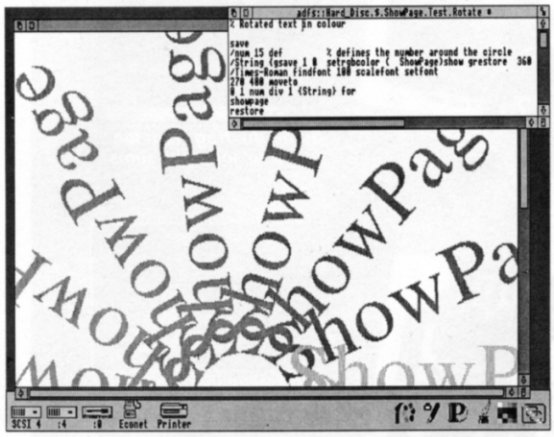
ShowPage supports the colour extensions and can create a sprite file of any required size. It can therefore be used to incorporate PostScript graphics into other RISC OS applications. It uses the RISC OS outline fonts, rather than the conventional PostScript fonts, for all rendering, so it is compatible with the wide range of Archimedes outline fonts now available for this computer.

ShowPage has a built in editor allowing PostScript programs to be created and executed directly, and interactively with the results shown on screen in another window.

Showpage is compatible with the output from Acorn PostScript printer drivers. Minimum recommended memory is 2Mbytes.

ShowPage can also be used with Laser-Direct to allow fast RISC OS printing over Econet.

PostScript is a trademark of Adobe Systems Inc



Illustrates example ShowPage program and resultant output

Package includes a spiral bound manual detailing the ShowPage version of the language. 320 page PostScript language reference manual by Adobe. 240 page PostScript language tutorial manual by Adobe. Discs containing ShowPage and example programs. AvantG, BookM, Pembroke RISC OS outline fonts.

£149+VAT (£171.35 incl.)

Computer Concepts Ltd

Gaddesden Place • Hemel Hempstead • Herts • HP2 6EX • Tel. 0442 63933 • Fax 0442 231632.

So your printer has a headache..

Surgeon Ken Down dons mask and rubber gloves in his operating theatre

SOON after you've bought your new printer and spent hours experiencing the thrill of decoding the handbook and setting the DIP switches, you begin to find your beautiful NLQ print looking rather gray and weedy.

It's then you discover the fact the salesman didn't tell you: Printer ribbons cost as much as a good game.

Old hacks know that a drop of stamp-pad ink on the cartridge roller does wonders, and once more your type can be bold and dark and handsome standing out blackly against the virgin page.

Even worn and fragile ribbons can be repaired with more surgery – extracting the perforated portion and joining the two ends of sound ribbon by laying one on the other and passing a hot soldering iron over them.

But one day you may find that underlining fails to work and even exercise – that jogger's grail – is not the answer to sticky pins.

Undoing the screws that hold the print head to its carriage will reveal the inside to be covered in a thick tarry residue of blue/black gunge. And the offending pin held immobile by an appalling mess.

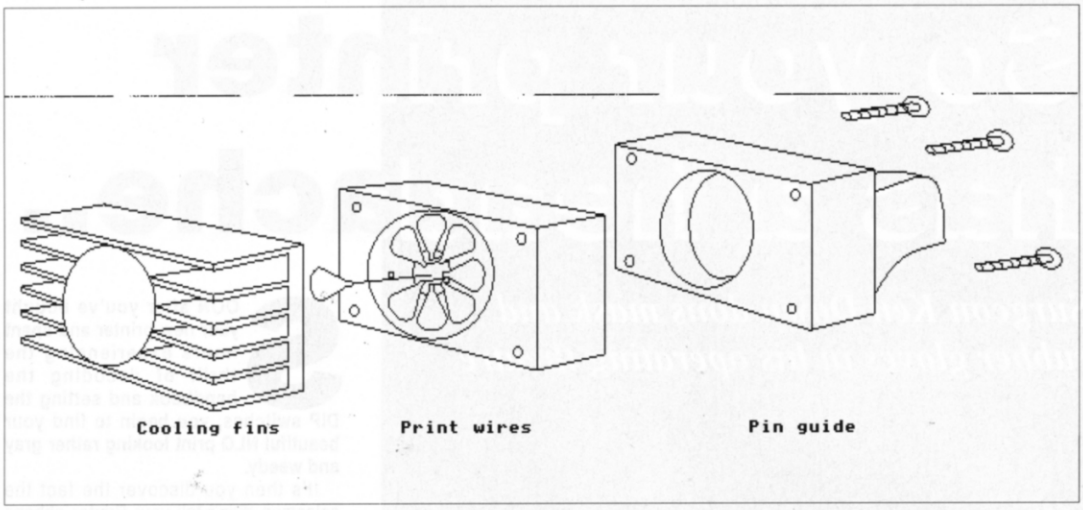
White spirit and cotton buds will produce a small improvement, but unfortunately, more drastic measures are called for. Bearing in mind that a new print head can cost as much as half the original price of the printer, the following is a first hand description of how to completely unclog your printer's head.

I placed the printer on a table with an adjustable light for illumination. In front of it I spread a clean, white sheet of paper so that any small parts which might spring out would be clearly visible. I washed my hands, took a deep breath and plunged in.

Around the outside of the print head were four cross-head screws holding the plastic front to the finned metal housing. I undid the screws with the appropriate screwdriver, taking care to hold the whole thing together firmly as I did so.

The print head then separated easily from the front of the head. No springs shot off across the carpet, though I had a magnet ready to help in the search if they did.

I put the housing next to the screws, holding the body of the head upright so ➤



How the print head comes apart

➤

that nothing could fall off.

Various bits of plasic and metal came next and I laid each one out on the paper, in order from left to right and all facing the same way – top away from me and bottom near me. That way there would be no problems when I came to re-assemble the head.

The print *engine* if that is the proper term, consisted of a thick doughnut of metal pierced by an oval hole. Around the doughnut were little metal leaves that trembled loosely on locating pins as I moved my hand. Curiosity impelled me to tug gently at one of these metal leaves.

To my astonishment it lifted easily from the locating pin. Even more surprising was the long wire that ran from the pointed end of the leaf down into the print head. I knew that we spoke of 9-pin printers. I hadn't realised that the pins were so long and slender.

I pulled the wire all the way out and laid it down on the paper, then did the same with the other eight, noting with satisfaction that several were heavily coated with the residue of the stamp-pad ink.

Now that the pins were out in the open, cleaning them shouldn't present any difficulties.

I turned the doughnut into the light and spotted nine tiny springs in front of the locating pins. Obviously the doughnut was some sort of electromagnet that could pull one or more leaves down to strike the attached wire against the paper while the springs served to push them back into the rest position.

The plastic front of the print head then parted company with the metal doughnut, but nothing had broken. Time, heat and pressure had been the only glue holding the two parts together.

At this point let me summarise: The print head consisted of three main parts – the finned metal casing at the rear to dissipate heat, the metal doughnut with its flexible circuit board that actually moved the pins, and the plastic front that provided a housing to hold the pins together in a vertical line just in front of the paper.

Inside these three large parts were the nine pins themselves, long wires attached to thin metal leaves that lay around the metal doughnut like petals on a daisy. Various odd bits of metal and plastic served to hold the leaves in position and four screws clamped the whole lot firmly together.

I started to clean the accumulations of ink off the various parts of the print head. White spirit did well with what was still tacky but failed to touch the dried ink. Methylated spirits was slightly more successful, but best of all was dry cleaning fluid.

Back together

I cleaned the wires one by one, taking care not to bend them, and finished off by wiping them with a tissue lightly moistened with thin oil. I used a cotton bud to clean the plastic housing inside and out, blowing through it until I could hold it up to the light and see that all nine holes were clean and smooth.

At last it was time to start re-assembling everything. I picked up the doughnut and arranged the pins neatly around the edge, then carefully fitted it all into place on the plastic housing.

There was a slight difficulty as the wires found their way into the holes, but a bit of judicious jiggling and juggling eased them into place.

The metal cover was last and then the four screws. I did them up tight and with a sigh of relief put the print head back on to the carriage and tightened the two screws that held it there.

Who said dot matrix printers were complicated?

Confidently I fed in some paper, switched on and pressed the combination of buttons that caused the printer to do a self test. Everything seemed fine: The print-head shunted back and forth making satisfactory rasping noises as the pins hammered the paper.

I glanced at the print-out and my blood froze. The paper was covered with what appeared to be a random pattern of dots that bore no resemblance to any of the printer's advertised alphabets or typestyles.

But I hadn't ruined the printer – I'd just put the pins back in the wrong order. Back to the screwdriver to take it all to pieces again.

Even by examining the printout carefully it was basically just trial and error before, three hours later, seven of the pins were printing out perfectly in their proper positions. Half an hour after that all nine were in place.

Ribbon restoring fluid, often in spray cans, is now available and is specially formulated to avoid the build up of the sticky residues that caused me so much trouble.

Although it is expensive, it is well worth the cost for the saving in ribbons and repair bills, or ribbons and frazzled patience if you are like me.

However, if you have been re-inking your ribbons and need to clean the head be very careful of the flexible circuit board that carries the signal from the printer to the print head. It is fragile and can be easily damaged by twisting or creasing.

I wasn't able to unplug mine, so had to do the whole job with the head still attached to the printer, which didn't make things easier.

Lay the parts out in order so that you can replace them easily and above all, check the order of the pins before you take them out!

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PROBLEM Solved

rectly you haven't set the word format. According to the manual the printer needs 8 bits per character, no parity with one or two stop bits. This can be set with *FX156,18. Try it with a simple Basic listing before delving into View.

If you still don't get any line feeds, you'll also need *FX6,0 to stop the micro filtering them out. Both the baud rate, word format and the filter character can be configured into the Master so that you don't need to set them up freshly each time. Check your manual for details.

Nothing on TV

MY BBC B has broken because it's not tuning into the TV. I had it set right and when I turned it on again it was not tuned in. I have tried fiddling with the dial, a different TV and different lead, but it wouldn't work. Please help. – **Greg Snowden, Rochdale, Lancs.**

● *The first thing you must establish is whether your micro is actually working. Does it give the usual beep-beep when you switch on? And if you press Control+G does it beep? If it does, you have a display fault.*

If you have access to a monitor see if you can get a picture using the RGB or Video Out sockets. Again, if you can it's just the UHF modulator – the metal box that the TV lead plugs into – that's gone wrong and needs replacing. Spares cost less than £10.

If the machine is completely dead, or the other display sockets don't work, you'll have to have it repaired.

A3000 plus Opus

I WOULD like to know if it's possible to connect an Opus Challenger 3 disc drive to a BBC A3000. I don't expect the ram disc to operate, but I understand that the disc drive can be connected to operate as a normal drive.

As I intend to keep my Model B, could the power supply continue to come from there, or should I provide a separate one?

If it can be connected to the A3000 can I still continue to use it with the BBC Micro? – **D. J. Winn, Doncaster.**

● *Yes it is possible to do this. First you need to get a disc buffer board for the A3000, then isolate the drive from the other electronics inside the drive.*

This probably just involves removing the lead going to the disc drive. Finally, you need a conventional disc drive lead from the buffer board to the drive. You can continue to use the same power supply.

However, if the reason that you want to connect it is to transfer software, you'd be better off getting the missing serial chips for your A3000 and buying some transfer software like the Ivory Ash Multi-tasking link or Beebug's SerialLink. That way you don't need to unplug anything.

Connecting up a better monitor

I HAVE acquired an ICL DRS colour monitor fitted with a 25 pin video connector and would like to know if it can be used with a Model B. The raster frequency is the same on the ICL monitor as on the Phillips one I'm using at the moment.

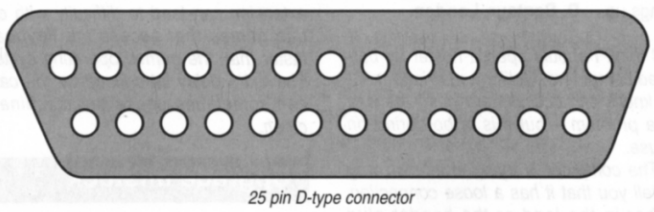
If it is possible could you tell me what connections I should make? – **G. W. L. Walker, Crewe, Cheshire.**

● *There are so many different types of 25 pin connector that it's impossible to say which one it is from your description. However D-type plugs are common in the computer industry.*

These have two rows of sockets having 12 below 13 staggered – the connector shell looks like a D, hence the name. As to the pin-out I don't know, but you can find out for yourself with a little experimentation.

First find the earth by looking at the continuity between that and the chassis. Connect that to your computer. Now turn up the brightness and connect the sync output in turn to each pin until you find one where the raster locks.

Then take the RGB leads in turn and find the appropriate connection. If you can't get the raster to lock it is likely that the monitor needs seperate line and frame sync signals. In that case you'll need to refer to the Body Building sync separator described in the May 1990 issue of ***The Micro User.***



25 pin D-type connector

Bigger drives

AFTER six years of owning a Model B I would like to upgrade the 100k drive to a twin 800k drive, but I'm concerned that the new drives won't be able to read my old discs. Also I'd like to know whether 2764 eproms are 8k or 16k. – **Philip Sharpe, Scunthorpe, South Humberside.**

● *The 800k units consist of two independent 80 track disc drives, each allowing 200k per side, if you are using DFS this means that each side is completely independent.*

To read your 40 track discs the drives will need to be 40/80 switchable, however if you have the Watford DDFS the software senses whether the disc is 40 or 80 track and compensates automatically.

A 2764 eprom is an 8k device – you can spot this easily as the digits after the 27 indicate the number of bits: 2764 means 64k bits, there are 8 bits to a byte so 64/8=8k. A 16k eprom is called a 27128.

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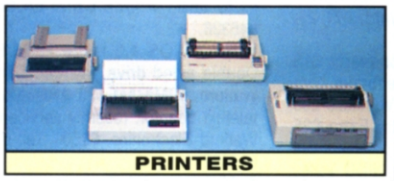
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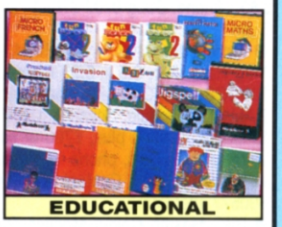
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Asteroids in orbit

Mike Cook tangles with the strange attractors

STRANGE attractors were last covered in *The Micro User* in November 1989 where they were used to generate fractal patterns. But there's much more to them than that: Not only are they an area of much new mathematical research, but they also provide some beautiful computer graphics. In this new series we'll be investigating some more things you can do with them.

Let's start first of all by explaining what we mean by an attractor. I am sure you have all played with a calculator, just pressing the buttons at random. So try this experiment. Enter any number and then keep on pressing the square root key.

No matter which number you first started with, eventually the calculator display will show one. This even happens if the initial number were less than one. Here we say that one is a point attractor for the process:

$$X_n = SQR(X_{n-1})$$

This simply means the next value of *X* is the square root of the last value of *X*.

Different processes have different attractors, for example consider what happens if you keep taking the square of a number. If the initial number is greater than one the process produces bigger and bigger numbers, in other words it has an attractor at infinity.

However, if the initial number is less than one the numbers get smaller and smaller – an attractor at zero. So the squaring process has two point attractors, and the attractor reached depends upon the initial number.

Point attractors however, are not very interesting. More likely to grab attention is what happens when the attractor is some form of path.

Such a path can be a simple closed loop like the orbit of a planet around the sun. When this is the case a point will always converge on a fixed orbit.

Finally the attractor can be not just simply a smooth path, but a fractal curve. This kind of a path is bound, so it will never shoot off to infinity, but the curve is of infinite length so that the point never visits the same spot twice. This is indeed a strange attractor.

As we have seen with the squaring process, many systems have more than one attractor, the one we end up on depends upon the starting conditions.

Very small variations in starting conditions will result in different attractors. This month let's look at attractors that model what is happening when something is in

Resonance and the Kirkwood gaps

There are spaces in the asteroid belt known as the Kirkwood Gaps that are believed to be caused by resonance effects.

To illustrate the resonant effects of an oscillator and a loosely coupled perturbator the KAM theorem is used. This describes motion confined to a torus – doughnut shape – given by the transformation:

$$X_{n+1} = X_n \cos(A) - (Y_n - X_n^2) \sin(A)$$
$$Y_{n+1} = Y_n \sin(A) + (Y_n - X_n^2) \cos(A)$$

So if we start any initial value of *X* and *Y* we will see the orbit of a body. As these get further away from the origin they become increasingly perturbed. The angle *A*, expressed in radians, represents the phase of the coupling.

Listing I demonstrates the KAM torus strange attractor. For a given value of *A* it will plot 300 points on successive orbits and then allow you to enter another value of angle.

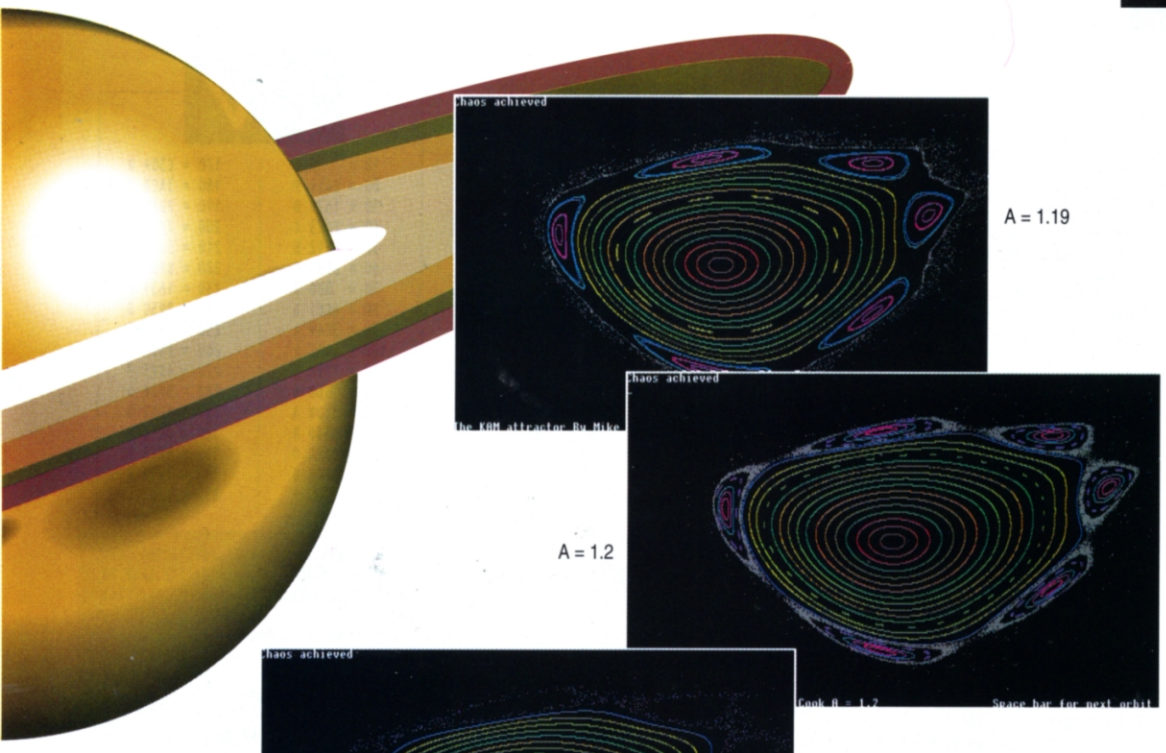
You will notice how the figures formed are extremely sensitive to the input angle. With a value of 1.1 all is calm, but when increased to 1.2 the outer orbits begin to break up.

At values between 1.264 and 1.3 islands of chaotic instability occur. Anything in this orbit would be thrown out by the forces.

As *A* is increased further things settle down again until *A=1.57* when very irregular orbits appear. As we increase *A* further we get inner square orbits with chaotic outer orbits.

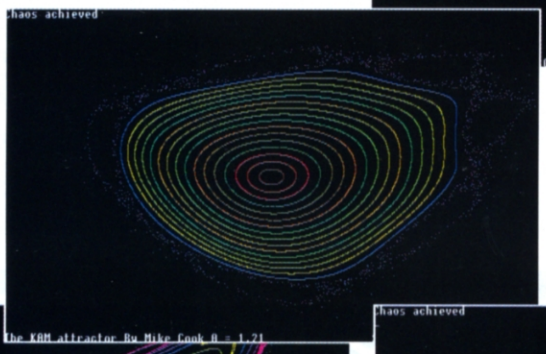
Finally at 1.7 things settle down again. As this angle is expressed in radians any further increase will see the orbits going through the same sort of cycle again.

The pictures opposite show the sort of effect you get.

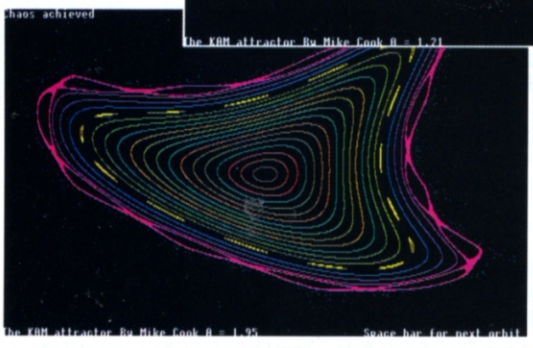


A = 1.19

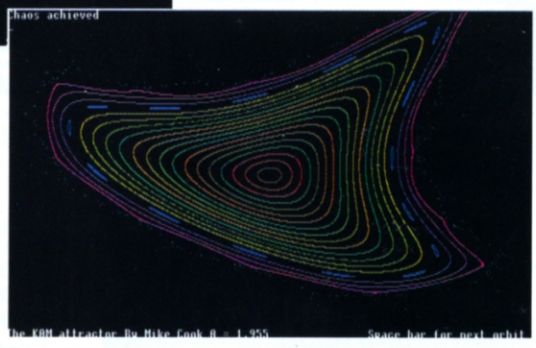
A = 1.2



A = 1.21



A = 1.95



A = 1.955

an orbit around something else, like asteroids around the sun.

Now if that's all there was to it, the orbits should be stable. However they are perturbed – disturbed slightly – by the mass of Jupiter. If two orbits of Jupiter take as long as five orbits of an asteroid we say there is a 2/5 resonance.

Any asteroid in this orbit would be thrown into a chaotic or unpredictable orbit or out of orbit altogether.

Listing I is written for the Archimedes series, but can be changed to run on any Acorn machine by changing line 80 to read MODE 0 and removing line 150.

Listing II shows a more precise way of investigating the strange attractor. In the first program we restricted the number of points per orbit to 300. However it turns out that this is too many for some orbits and too few for others. In Listing II the orbit is only changed when the spacebar is pressed.

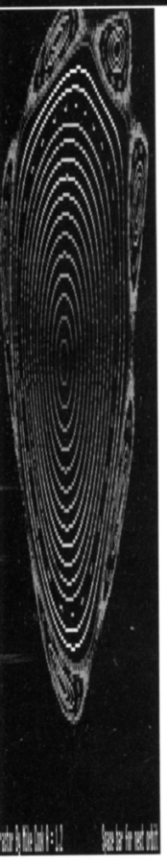
In addition, once the point moves off to a value so large that the graphics routines of the computer complain, the series of plots is terminated and you can enter a new angle.

This allows you time to develop all the strange attractor when chaotic islands are being created. Also some of the orbits are truly broken, having forbidden zones.

● *Next month we will look at another form of strange attractor – The Duffing Oscillator.*

Listing I

```
   10 REM > KAM_ATRACT
   20 PRINT"Strange Attractors 1"
   30 PRINT"The KAM attractor"
   40 PRINT"By Mike Cook"
   50 PRINT"A defines the Angle of the o
rbit in radians"
   60 REPEAT
   70 INPUT"Enter a value for A about (1
.1 to 1.7) ",A
   80 MODE 15
   90 PRINT TAB(0,0);"The KAM attractor
By Mike Cook"
  100 sinA=SIN(A)
  110 cosA=COS(A)
  120 C%=0
  130 FOR orbit= 0.1 TO 2.5 STEP 0.05
```



```
  140 C%=C%+1
  150 GCOL 0,C%
  160 U=orbit/3
  170 V=orbit/3
  180 FOR B%= 1 TO 300
  190 IF ABS(U)>1E6 OR ABS(V)>1E6 THEN G
OTO 240
  200 PLOT 69,(U*640)+640,(V*512)+512
  210 X=U*cosA-(V-U*U)*sinA
  220 Y=U*sinA+(V-U*U)*cosA
  230 U=X:V=Y
  240 NEXT
  250 NEXT
  260 PRINT TAB(0,0)"This is A = ";A;SPC
(18)
  270 PRINT TAB(0,31);
  280 UNTIL FALSE
```

Get it right ✓

```
10 =    0 0
20 = E419 9
30 = 167B B
40 = FC23 C
50 = 429E A
60 = BFBA E
70 = A084 C
80 = 4C61 F
90 = 8D5D 3
100 = 38DD C
110 = A38D C
120 = DDEC 4
130 = 5C49 4
140 = 3AEB 0
150 = FD7B 8
160 = 7FA6 9
170 = 52E2 7
180 = CDD5 6
190 = A474 E
200 = 4A95 4
210 = 793C D
220 = 7DB2 A
230 = F5D9 C
240 = 2C83 C
250 = 2C83 4
260 = F286 7
270 =  E60 6
280 = 226C B
```

Get it right ✓

```
10 =    0 0
20 = E419 9
30 = 167B B
40 = FC23 C
50 = FE12 E
60 = BFBA 9
70 =  3DD 7
80 = 4C61 E
90 = 3C49 A
100 = 4187 E
110 = 7392 8
111 = 130B 6
120 = 38DD A
130 = A38D D
140 = DDEC 0
150 = BFBA 8
160 = 178B F
170 = C30A B
180 = 3AEB 6
190 = FD7B 3
200 = 7FA6 B
210 = 52E2 2
220 = BFBA 8
230 = 1639 6
240 = 793C 8
250 = 7DB2 5
260 = F5D9 A
270 = 4CF5 7
280 = BFBA D
290 = 1068 8
300 = DCF2 4
310 = BCFB 0
320 = 2B9A 4
330 = 226C C
```

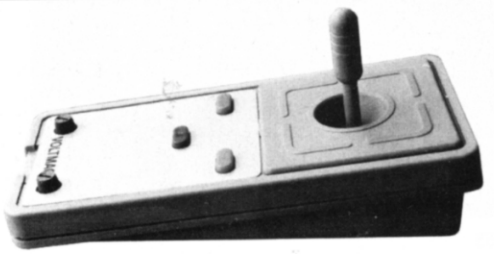
Listing II

```
   10 REM > KAM_ATRAC2
   20 PRINT"Strange Attractors 1"
   30 PRINT"The KAM attractor"
   40 PRINT"By Mike Cook"
   50 PRINT"Press the space bar to get o
nto the next orbit"
   60 REPEAT
   70 INPUT"Enter a value for A (1.1 to
1.7) ",A
   80 MODE 15
   90 CH%=0
  100 orbit=0
  110 PRINT TAB(0,31);"The KAM attractor
 By Mike Cook A = ";A;
  111 PRINT TAB(55,31);"Space bar for ne
xt orbit";
  120 sinA=SIN(A)
  130 cosA=COS(A)
  140 C%=0
  150 REPEAT
  160 orbit=orbit+0.1
  170 PRINT TAB(0,0);"Orbit value ";orbi
t;SPC(6)
  180 C%=C%+1
  190 GCOL 0,C%
  200 U=orbit/3
  210 V=orbit/3
  220 REPEAT
  230 IF ABS(U)<1E6 AND  ABS(V)<1E6 THEN
 PLOT 69,(U*640)+640,(V*512)+512 ELSE PR
INT TAB(0,0);"Chaos achieved ";SPC(6):CH
%=1:GOTO 270
  240 X=U*cosA-(V-U*U)*sinA
  250 Y=U*sinA+(V-U*U)*cosA
  260 U=X:V=Y
  270 UNTIL INKEY(-99)
  280 REPEAT
  290 UNTIL NOT(INKEY(-99))
  300 UNTIL CH%=1
  310 PRINT TAB(0,0);
  320 *FX21,0
  330 UNTIL FALSE
```


Access

VOLTMACE

VISA



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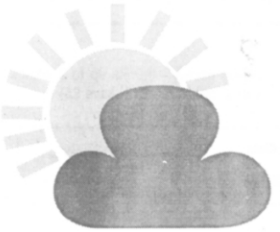

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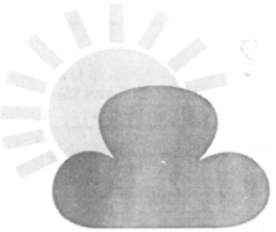

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What's bugging you?

In the final article of this fault finding series Stephen Ramplin pokes into some low level problems

Putting everything into perspective, Basic actually provides volumes of help when an error occurs compared to that given to the machine code programmer, who receives none. Also errors in Basic programs are *usually* quite simple to solve.

To wind up the series we'll look at how to tackle bugs in assembly language and the machine code it produces.

There are three errors associated with the assembler: *Out of range, Byte* and *Index*. Often their cause is relatively obvious but confusing circumstances can arise.

● Let's take *Byte* first. This occurs if you try to load a register with a value greater than 255, however it can be puzzling when this error is applied to the line:

```
LDA (address),Y
```

The actual fault was in the main Basic program where the variable *address* had taken on an erroneous value greater than 255.

● *Index* errors occur when you try to use a non-existent indexing mode. Replace the offending instruction and all will be well.

● Finally, *Out of range*. This error arises when a branch instruction tries to branch further than 129 bytes forward or 126 backward. Sometimes it can be avoided by careful code construction. However it's easily corrected with a reverse branch. For example, replace *BCC loop* with:

```
BCS over:JMP loop:.over
```

Out of range problems can also be due to the naughty habit of multiple label definition. Here, substituting a reverse branch and a jump will more than likely result in havoc, with the code jumping to the wrong label.The fact is that if you use the same label in a program more than once you are asking for trouble. Unfortunately the Basic assembler doesn't tell you when you've done it.

Listing I, written in assembler for speed, checks for multiple label definitions. When run it saves some code to under the filename *Label*. To check a program enter:

```
*RUN LABEL
```

and any label redefinitions are listed with their line numbers.

I advise you to test all assembler programs with this utility – it's best to be on the safe side. See the panel for a brief description of the program for the techies among you.

If the compiled code fails to work, what then? To begin with, check the obvious. Are you executing non-relocatable code at the wrong address, or trying to run a conditional assembly under the wrong conditions?

Perhaps you are trying to run code on an incompatable hardware setup: Many illegal operations work fine until they are tried on second processor.

Backward compatability between machines should be taken into account. The original 6502 processors don't have the new codes of the chips of the Master series: STZ, store a zero, for example.

Another point to be aware of is a bug in the 6502 concerning an indirect jump which crosses a page boundary, although it is unlikely this will be the cause of any fault.

For example, the instruction JMP (&9FF) would not work because, although it correctly takes the low byte from &9FF, it erroneously takes the high byte from &900 – not &A00, as it should. Let's imagine your machine code masterpiece has done absolutely nothing. Some method is required to assess where program execution has reached.

Here a deliberate error is used – similar to using STOP in Basic programs – to halt the program at a specific point and print a message. This is achieved using the BRK instruction.

When such an instruction is executed the data following it is passed on to the current language, which reports it as an error. The convention for data following a BRK is one byte containing the error number, followed by the error message ending in a zero.

For example, inserting the string ERROR! as the error message will halt execution at the BRK and the message ERROR! is printed. By slowly moving this instruction through your program you can find the point where things go wrong.

Let's assume the problem is in the middle of a complex loop. Does it occur immediately, after the first pass, the second, the hundredth? To find out insert a beep and a pause – to prevent the beeps merging into a

➤

➤

continuous tone – into the loop. The code:

```
PHA:LDA#7:JSR&FFEE:JSR&FFE0:PLA
```

is fine. Count the beeps to assess how many times the loop is executed. You will need to press a key after each one.

Once you know where the problem lies how do you find out what it is? Clearly some kind of investigative tool to display register and memory values would be useful. You could then see when a register took on an illegal value and identify the exact piece of code where it occurred, enabling you to correct the problem.

For instance, a loop may end with an addition or subtraction, where a forgotten CLC or SEC could falsify a data offset, resulting in chaos. Similarly, when adding the contents of the X or Y register to the accumulator a misplaced TXA or TYA would lead to hopeless confusion. To make matters worse, it is possible these two examples wouldn't cause problems till the second pass.

Such faults could be painlessly pinpointed using a utility like that described above. Enter Program II which is a BRK Handler like the Basic error handler. It prints the values of all the registers and the contents of a specified list of memory locations, with a maximum of 32, whenever a BRK is encountered in the code.

The addresses are stored between &8C0 and &8FF and the byte following the BRK equals 46 plus the number of memory locations whose contents are to be printed.

This restricts the error number to between 46 and 78, allowing the handler to distinguish between machine code BRKs to which it responds and errors of the Basic rom. Finally, you may return to your program or quit.

When run Program II saves a machine code routine under the filename BRKcode. It then runs a demonstration. The memory addresses are set up by DEFPROCset, which stores the addresses of the first 32 bytes of the program in the workspace. The registers are then set up with initial values and a test routine is called.

To use the utility in your own programs first enter *RUN BRKcode. Henceforth, a BRK in your code will activate it. Don't forget to add the byte after the BRK, which should be 46 if you don't want a memory dump.

Some final pieces of advice: Always write and test your machine code programs in sections, merging them together later on. If the individual sections work, then the whole program will probably work too. At the least, the debugging process will be much easier.

Secondly, plan all code thoroughly. With practice and perseverence you'll soon have your sick programs on the mend.

● *Remember: Prevention is better than the cure.*

How the BRK handler works

In order to implement the BRK handler the break vector is intercepted to point to the program. Henceforth, when a BRK is encountered the handler is called.

On entry, the BRK handler first checks to see if the byte after the BRK, the error number, is in the required range, 46 to 78 inclusive. This prevents the handler responding to Basic errors.

The value of the accumulator and registers, including the status register, are then printed, followed by the dump of the memory locations.

An option is given to return to the program after the BRK, using the instruction RTI, or to quit. The quit is implemented by executing an error with ERR equal to zero.

The processor generates an interrupt when a BRK instruction is executed. The address of the second byte to follow the BRK is pushed onto the stack, high byte first, followed by the status register. Interrupts are then disabled and execution continues from the address contained in &FFFE/&FFFF.

This is the operating system's BRK handling routine. The address of the byte following the BRK, usually the error number, is stored in &FD/&FE, sideways roms are informed of the BRK using service call six and the number of the currently active rom is stored in page two. Control is then passed to the current language via the address in the break vector, &202/&203.

In sideways roms a BRK instruction is dealt with in a specific way, which differs between service and language roms. If you're unsure about the difference refer to a copy of the Advanced User Guide. The first point to note is that it is the responsibility of the language rom to report the error.

With service roms, a BRK must be copied to main ram and then executed by JuMPing to its address. The bottom of the machine stack, &100 onward, is the usual error message buffer. The operating system then passes the error on to the current language via the break vector.

A language rom must alter the address in this vector to point to its own error handler. The error routine prints the error message and resets the machine stack with the code LDX#&FF then TXS. The error number may be ignored.

The address in &FD/&FE points to the byte immediately after the BRK, so indirect indexed addressing can be used to print the error message.

Listing I:

```
   10 REM Multiple Label Lister
   20 REM By Stephen Ramplin
   30 REM (c) The Micro User
   40 MODE135
   50 ONERROR MODE7:REPORT:PRINT" at lin
e ";ERL:END
   60 top=&12:page=&18:himem=&06:space=&
70:address=&72:number=&74:temp=&76
   70 oldval=&77:countA=&79:countB=&7B:a
ddressA=&7D:addressB=&7F
   80 datatkn=&DC:remtkn=&F4:oswrch=&FFE
E:osnewl=&FFE7:oscli=&FFF7
   90 PROCassembler
  100 PRINT'"Press Return to SAVE the ma
chine code":REPEATUNTILGET=13
  110 $&700="SAVE LABEL 900 "+STR$~P%+"
"+STR$~start:X%=0:Y%=7:CALLoscli
  120 PRINT"Press Return to test the cod
e":REPEATUNTILGET=13
  130 CALLstart:END
  140 DEFPROCassembler:FORpass%=0TO2STEP
2:P%=&900:[OPTpass%
  150 .nextquote INY:LDA(address),Y:CMP#
34:BNEnextquote:INY:JSRadd:BEQloop
  160 .newline INY:LDA(address),Y:CMP#13
:BNEnewline:INY:.prelineend DEY
  170 .lineend INY:LDA(address),Y:BMIdon
e:STAnumber+1:INY:LDA(address),Y
  180 STAnumber:INY:INY:JSRadd:BEQloop:.
done JMPdone2
  190 .start LDAtop:STAspace:LDAtop+1:ST
Aspace+1:LDApage:STAaddress+1
  200 LDY#0:STYaddress:.loop LDA(address
),Y:CMP#13:BEQlineend:CMP#34
  210 BEQnextquote:CMP#datatkn:BEQnewlin
e:CMP#remtkn
  220 BEQnewline:CMP#ASC"\":BEQpassrem:C
MP#ASC".":BEQcheckiflabel
  230 INY:JSRadd:BEQloop:.passrem INY:LD
A(address),Y:CMP#13
  240 BEQprelineend:CMP#ASC":":BNEpassre
m:INY:JSRadd
  250 BEQloop:.checkiflabel INY:LDA(addr
ess),Y:AND#&DF:CMP#ASC"A"
  260 BCCnot:CMP#ASC"Z"+1:BCCstore:.not
JSRadd:BEQloop
  270 .store JSRadd:LDAaddress:STA(space
),Y:INY:LDAaddress+1
  280 STA(space),Y:INY:LDAnumber:STA(spa
ce),Y:INY:LDAnumber+1:STA(space),Y
  290 LDA#4:CLC:ADCspace:STAspace:BCCnoc
D:INCspace+1
  300 .nocD LDAspace+1:CMPhimem+1:BCCloo
p:LDAspace:CMPhimem
  310 BCCloop:BRK:BRK:OPT FNequs("No Roo
m"):BRK
  320 .done2 LDAtop:STAcountA:LDAtop+1:S
TAcountA+1
  330 .dloopA LDY#0:LDA(countA),Y:STAadd
ressA:INY:LDA(countA),Y
  340 STAaddressA+1:CLC:LDAcountA
  350 ADC#4:STAcountB:LDAcountA+1:ADC#0:
STAcountB+1
  360 .dloopB LDY#0:LDA(countB),Y:STAadd
ressB:INY
  370 LDA(countB),Y:STAaddressB+1:DEY
  380 .dloopC LDA(addressA),Y:CMP(addres
sB),Y:BNEnotsame
  390 CMP#ASC" ":BEQsame:CMP#ASC":":BEQs
ame:CMP#&0D:BEQsame
  400 INY:BNEdloopC:.same STYtemp
  410 JSRprint:OPT FNequs("Multiple Defi
nition of ."):BRK:LDY#0
  420 .lbloop LDA(addressA),Y:JSRoswrch:
INY:CPYtemp:BNElbloop
  430 JSRprint:OPT FNequs(" at line "):B
RK:LDY#2:LDA(countB),Y
  440 STAnumber:INY:LDA(countB),Y:STAnum
ber+1:JSRplnum
  450 JSRosnewl:.notsame CLC:LDAcountB
```

Listing II:

```
   10 REM BRK Handler
   20 REM Stephen Ramplin
   30 REM (c) The Micro User
   40 ONERROR MODE7:REPORT:PRINT" at lin
e ";ERL:END
   50 MODE135
   60 *FX200
   70 *KEY10 OLD|MRUN|M
   80 brkv=&202:oldbrk=!brkv AND&FFFF
   90 osbyte=&FFF4:osasci=&FFE3:osnewl=&
FFE7:osrdch=&FFE0:pointer=&A8
  100 brkhandler=&913:IFbrkhandler=oldbr
k CALL!-4 ELSE*FX18
  110 PROCassemble
  120 PRINT"Press Return to save the mac
hine code":REPEATUNTILGET=13
  130 $&700="SAVE BRKcode 900 "+STR$~P%
  140 X%=0:Y%=7:CALL&FFF7
  150 PRINT'''"DEMONSTRATION:"
  160 CALLinit:PROCset:X%=2:Y%=&FF:A%=1:
CALLtest:END
  170 DEFPROCassemble:FORpass%=0TO2STEP2
:P%=&900:[OPTpass%
  180 .init:LDX#brkhandler MOD256:LDY#br
khandler DIV256
  190 SEI:STXbrkv:STYbrkv+1:CLI:RTS
  200 .not:PLA:TAY:PLA:JMPoldbrk
  210 .brkhandler:PHA:STA wkspc:TYA:PHA:
LDY#0:LDA(&FD),Y:CMP#46
  220 BCCnot:CMP#79:BCSnot:PLA:PHA:TAY:T
XA:PHA:JSR osnewl:LDA#ASC"A"
  230 JSR printreg:STX wkspc:LDA#ASC"X":
JSR printreg:STY wkspc
  240 LDA#ASC"Y":JSR printreg:JSRosnewl
  250 JSR print:OPT FNs("Status (NV-BDIZ
C):"):BRK:TSX:LDA&104,X
  260 PHA:JSR binary:JSR space:LDA#ASC"(
":JSR osasci:JSR ampersand
  270 PLA:JSR hexprint:LDA#ASC")"
  280 JSRosasci:LDY#0:LDA(&FD),Y:SEC:SBC
#46:BEQ nodump:CMP#33:BCCfine:LDA#32
  290 .fine:STA number:JSR osnewl:LDY#0:
JSRosnewl:.dumploop
  300 JSRampersand:LDA &8C1,Y:STA pointe
r+1:JSR hexprint:LDA &8C0,Y
  310 STA pointer:JSR hexprint:LDA#ASC"=
":JSR osasci:JSR ampersand
  320 STYtemp:LDY#0:LDA(pointer),Y:JSR h
exprint:LDY temp:JSR space
  330 INY:INY:DEC number:BNE dumploop:.n
odump:JSR osnewl:JSR print
  340 OPT FNs("(Q)uit or (R)eturn?"):BRK
:JSR osnewl:PLA:TAX:PLA:TAY
  350 .getchr:JSR osrdch:BCS quit:AND#&D
F:CMP#ASC"Q":BEQ quit:CMP#ASC"R"
  360 BNE getchr:PLA:RTI:.quit:LDA#quite
rr MOD256:STA&FD
  370 LDA#quiterr DIV256:STA&FE:PLA
  380 JMPoldbrk:.quiterr:OPT FNb(0):OPT
FNs("Quit"):BRK
  390 .hexprint:PHA:LSRA:LSRA:LSRA:LSRA:
JSRnibble:PLA
  400 .nibble:AND#&0F:SED:CLC:ADC#&90:AD
C#&40:CLD:JMP osasci
  410 .print:PLA:STA pointer:PLA:STA poi
nter+1:LDY#0
  420 .ploop INC pointer:BNE nocarry:INC
 pointer+1
  430 .nocarry:LDA (pointer),Y:BEQ done:
JSR osasci
  440 JMP ploop:.done:LDA pointer+1:PHA:
LDA pointer:PHA:RTS
  450 .printreg:JSR osasci:LDA#ASC":":JS
R osasci:JSR ampersand
  460 LDA wkspc:JSR hexprint:JSR space:.
space:LDA#ASC" "
  470 BNE output:.ampersand:LDA#ASC"&":.
output:JMP osasci
  480 .binary:STA wkspc:LDX#8
  490 .bit:ASL wkspc:LDA#ASC"0":ADC#0:JS
R osasci:DEX:BNE bit:RTS
  500 .wkspc OPT FNb(0):.number OPT FNb(
0):.left OPT FNb(0):.right OPT FNb(0):.t
emp OPT FNb(0)
  510 .test:DEX:STXtestspc:BRK:OPT FNb(4
6+32):BPLtest:RTS
  520 .testspc OPT FNb(0):]
  530 NEXTpass%:ENDPROC
  540 DEFFNb(byte%):?P%=byte%:P%=P%+1:=p
ass%
  550 DEFFNs(string$):$P%=string$:P%=P%+
LENstring$:=pass%
  560 DEFPROCset:FORN%=&900TO&91F:?(&8C0
+(N%-&900)*2)=N% MOD256:?(&8C1+(N%-&900)
*2)=N% DIV256:NEXT:ENDPROC
  460 ADC#4:STAcountB:BCCnocB:INCcountB+
1:.nocB LDAcountB
  470 CMPspace:BNEdloopB:LDAcountB+1
  480 CMPspace+1:BNEdloopB:CLC:LDAcountA
:ADC#4:STAcountA
  490 BCCnocC:INCcountA+1:.nocC
  500 SEC:LDAspace:SBC#4:CMPcountA:BEQov
erA:JMPdloopA
  510 .overA LDAspace+1:SBC#0:CMPcountA+
1:BEQoverB:JMPdloopA
  520 .overB RTS:.plnum LDA#0:STAtemp:LD
Y#4:.pnumlp LDX#ASC"0"-1
  530 .subloop INX:SEC:LDAnumber:STAoldv
al:SBCtable_lsb,Y:STAnumber
  540 LDAnumber+1:STAoldval+1:SBCtable_m
sb,Y:STAnumber+1:BPLsubloop
  550 LDAoldval:STAnumber:LDAoldval+1:ST
Anumber+1
  560 TXA:CMP#ASC"0":BNEpnum:LDAtemp:BEQ
pnum:TXA
  570 .pnum STAtemp:JSRoswrch:DEY:BPLpnu
mlp:RTS
  580 .table_lsb OPT FNdata("01DA64E810"
):.table_msb OPT FNdata("0000000327")
  590 .print PLA:STAaddress:PLA:STAaddre
ss+1:.ploop
  600 LDY#1:JSRadd:LDA(address),Y:BEQpdo
ne:JSRoswrch:JMPploop
  610 .pdone LDAaddress+1:PHA:LDAaddress
:PHA:RTS
  620 .add TYA:CLC:ADCaddress:STAaddress
:BCCnoc:INCaddress+1
  630 .noc LDY#0:RTS:.test:.test:]
  640 NEXTpass%:ENDPROC
  650 DEFFNequs(A$):$P%=A$:P%=P%+LENA$:=
pass%
  660 DEFFNdata(data$):FORC%=1TOLENdata$
STEP2
  670 ?P%=EVAL("&"+MID$(data$,C%,2)):P%=
P%+1:NEXT
  680 =pass%
```


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```
  10 =    0 0  120 = 5291 E
  20 =    0 0  130 = 7A0D C
  30 =    0 0  140 = A5D2 5
  40 = 936C C  150 = 3F53 6
  50 = 5E50 9  160 = 12AD 5
  60 =  71C 1  170 =  8D6 3  230 = CA7A 4  290 = 5F91 8  350 = D633 B  460 = 22FF 2
  70 = 8FBE 8  180 = 356E F  240 = 9BEB B  300 = 495C 7  360 = 21B2 3  470 = A164 0
  80 = 519A F  190 = E758 7  250 = DB9E 2  310 = 793D A  370 = 1D77 7  480 = A2FA 5
  90 = 3202 8  200 = F2B3 1  260 =  85D 7  320 = 7B56 B  380 = A009 7  490 = 57BC 9
 100 = 1266 3  210 = 6C8E 8  270 = 463C B  330 = D6D7 B  390 = 474F 8  500 = E874 A
 110 = 126A 7  220 = 2579 3  280 = C2CF 6  340 = 1FE0 3  450 =  536 0  560 = BF6F 2
```

Get it right ✓

```
  10 =    0 0  240 = 453F C  470 = 78E5 1
  20 =    0 0  250 = 9CB1 A  480 = E44B 7
  30 =    0 0  260 = 84B4 6  490 = 40E7 9
  40 = 5E50 0  270 = E273 2  500 = CC8D B
  50 = 936C F  280 = C1F9 3  510 = 7ABB 1
  60 =  FA7 8  290 = F7A6 0  520 = 3EA2 E
  70 = 9C0A 1  300 = 3BF6 D  530 = DF96 A
  80 = B694 F  310 =  701 1  540 = A6F8 2
  90 =  6A6 E  320 = BE8E 1  550 = C312 6
 100 = 7686 5  330 = 9C27 7  560 = 8DF8 C
 110 = C801 6  340 = C02C 1  570 = 8321 B
 120 = FC4C 8  350 = 42D4 C  580 = 51D9 0
 130 = A6D8 0  360 = BE9D 1  590 = A8B9 7
 140 = C27A D  370 = D07E 5  600 = 49E6 2
 150 = F2F3 5  380 = DE9E 8  610 = C529 6
 160 = 76F3 B  390 = D280 1  620 = 9976 6
 170 = 7D92 3  400 = 888B 2  630 = F871 9
 180 = 6C27 B  410 = BB26 8  640 = F81E 0
 190 = 64CB 8  420 = FF71 8  650 = 33F7 0
 200 = 1D20 D  430 = A8E8 4  660 = C297 1
 210 = 4B81 4  440 = 9573 D  670 = C922 6
 220 = D099 A  450 = F945 8  680 = FBBA 4
 230 = 1947 A  460 = 2DE9 0
```

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MU4

Hints, tips and shortcuts

Teri Paul examines some programming bits and pieces – courtesy of the PD

ONE of the best things about the public domain it that you can access other people's useful utilities. All programmers develop their own shortcuts and specific programs to speed up work or to fulfull an academic interest. The more altrusitic pop them into the public domain.

As the concept of the public domain was widespread before the Archimedes was available, many developers and programmers have been able to acquire programs and languages from other machines which can then be used on the Arc.

Luckily for us less talented mortals they have reciprocated and added to the PD items specific to the Archimedes. Mod-Dis, for example, is an intelligent module disassembler which is very useful for finding out how other programmers managed to accomplish particular tasks.

Saving money and time

As you doubtless appreciate, this side of the public domain can really save you money and more than that if you use !Backup3.

If you have a hard disc you probably know that you should back up all your work each day on to floppy discs. But come clean, how many of you do? As the name implies !Backup3 allows you to keep your records up to date simply and quickly.

!DiscEdit is another program simple in concept but oh so useful. Allowing you to alter disc data directly, it looks at the individual sectors which can then be altered. This is useful for looking at hidden files or for changing error messages in a module.

Another interesting little program is !ClipBoard which modifies the way writeable icons work, letting you cut and paste text information.

And while we are on the theme of editing, there is !SetType which lets you alter file types, for example you can change a data file to look like a text file and, as long as it does contain text, it will act like any other text file.

!Filter is one utility which I find both useful and aggravating. It's useful because it lets you strip out or alter undesirable control codes in file formats that you don't have the software to handle.

By using *DUMP you can discover which characters the file has that you don't want, or would prefer to change and then modify !Filter to make the necessary changes.

Unfortunately !Filter is a real pain to use – having to click through each of the 256 codes to find those that need changing is awful. Still, it's all we've got at the moment.

You may not have a use for all the programs mentioned so far, but everyone needs to format discs. !Format is a multitasking program, which means you can get on with other work while the formatting takes place.

As with all such utilities, you need to take care and with this one you need to do so more than usual. Of course it'll be out of date when Risc OS 3 arrives soon.

!GuessType was the next utility to pop up on my icon bar. Designed for those who download programs from bulletin boards, it does have a wider use.

You may not necessarily know the type of the file you have acquired, but by popping it into !GuessType it will examine the format of the file and make an educated guess as to whether it's text, draw format, GIF, or something else.

We've put *The Micro User*'s own Basic loader, !LoadBasic, into the PD this month too. All you have to do is put the BasicEdit module in the directory and off you go, before you say "I've already got one of those" it does have a help file which is recommended reading.

!Menon is a nice shortcut to add to any Archimedes. Basically it sits on the icon bar and when you click Menu over it you get a list of programs, directories or sub-menus you have chosen, allowing very fast access to any part of your hard disc with just two clicks of a mouse's button.

Beginners will find it amazingly useful, especially if the alternative is searching through vast numbers of directories and sub-directories on a packed hard disc.

It can be used with a floppy system too, especially as Menon will prompt you for the disc that the required program is on.

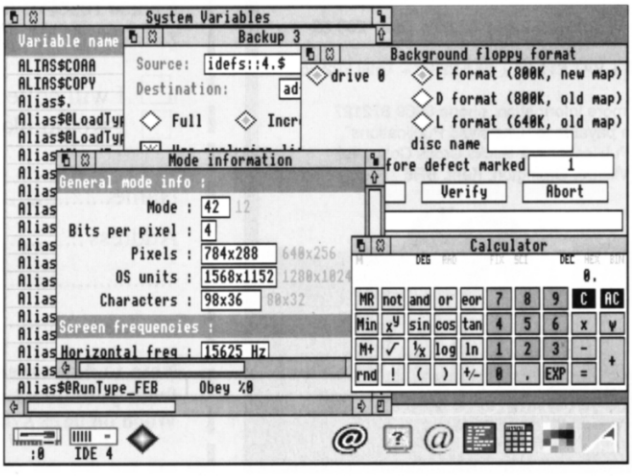
I've only come across one problem with it: If the !boot file of an application hasn't been seen you may end up with an invisible icon because the necessary sprite hasn't been loaded. The only useful option here is to alter the !Run file to include the line:

```
IconSprites <obey$dir>
```

somewhere near the beginnning.

Another useful customisation is !PseudoApp, which allows you to make copies of applications in any directory – with one small difference: It's not really a copy, but a reference to the original version. So you can collect any applications for a particular purpose into one working directory wthout making genuine duplicates – thus saving disc space.

Sometimes the information you want isn't in the form you need. !ModeInfo lets you know which mode you are in at present, or if you access the menu it will tell you which



A deluge of useful programs

modes are available and information on each. It gives pixel size, horizontal and vertical frequences as well as information on the current state of VIDC – part of the Arm chip set.

On the other hand !VarEdit saves time and frustration. If you want to edit your system variables you have to use *SHOW, find the one you want and retype any changes.

But !VarEdit puts all your system variables in a window where you can modify the variables within the DeskTop – much more easily.

Anyone who has been plagued by field mice may have been tempted to resort to poison. But !Warfarin allows you to use the cursor keys on the DeskTop, should the unthinkable happen and your mouse suffer from an early case of rigor mortis.

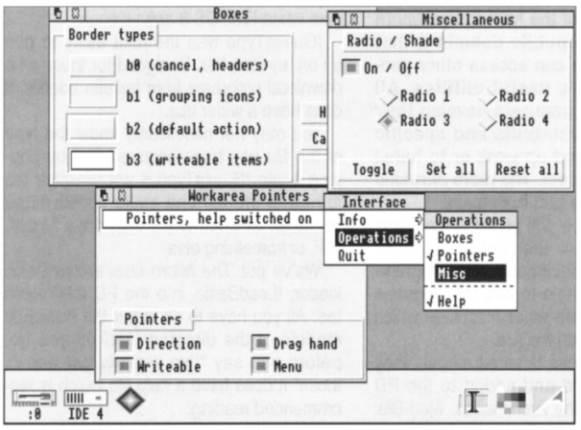
It even allows you to drag files around, though you need to be deft to accomplish this properly.

One of the many professional touches given to Impression is the slabbed or 3D icons which are also becoming popular in other applications. The Interface module will let you create your own DeskTop icons in the same style. It comes complete with good examples and useful documentation.

Looking closely at my monitor the other day I noticed some burn in – you can still see the DeskTop icons even when the machine is turned off. After satisfying myself it was not my eyes, I delved into my PD box of tricks and unearthed VDUSaver.

If you haven't typed on or used your screen for a time, it switches itself off. I'm now on the look out for some pretty screen savers à la Apple Macintosh or PC.

While I'm on bended knee has anyone got a copy of the new !DeskDuck? – not only does he go fishing, but eventually go to sleep head under wing. If anyone can help, please drop me a line.



Interface makes slabbed icons easy

The monthly disc

You'll find all the programs I've mentioned on this month's subscription disc. To cram in as much as possible we have archived the programs to fit 1.6Mb into 800k.

You'll also find Vkiller to wipe out the Extend virus. Double click on the archive file you want and drag it out of the archive before trying to run it – full instruction are given on the disc.

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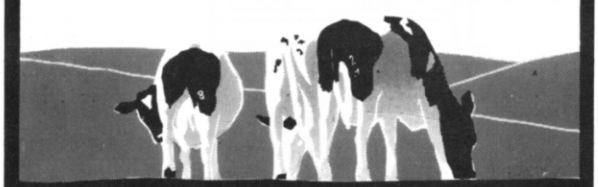

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Reviewed in Risc User, October 1990

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ACCESS VISA

Diary of NOVEMBER

Steve Parkinson continues to reveal the trials and triumphs , the graft and the glory, involved in writing an arcade game for the BBC Micro

November...

I'M still in a planet mood – where fuel, food and maybe a few bonus points are collected – so made a couple of further additions to the routine. This is all very well, but the player doesn't really get anywhere or do anything gamewise.

Sticking a time limit on it would only add to the pressure and make it more like a souped-up bonus round rather than an integral part of the game. Must be time to incorporate another factor to the storyline – definitely preferable.

In the space bit, you have to collect a substance called *Arionite* from rocks or asteroids by firing on them until they are red hot and then ramming them. This substance will help to fuel the transporter which gets you to the planet's surface.

I already decided that the mode of transport is to be something resembling a pod or capsule, but I mustn't forget that this is also the machine which enables Hugard to travel through time.

Having one machine to travel through time and another to fly around in would look a little silly, methinks. So where is Hugard going to get the fuel for this machine?

You guessed it: The pod runs on a fuel which can be found on the planet and is known as Macma. It is used to fuel the machines constructing the planet of Antarius – where Hugard comes from.

Ramming one of these and swiping its fuel will enable you to transport away from the planet and then through time to the next stage of your journey.

I haven't decided how the quantities of chemicals are to be displayed on-screen yet – maybe in the form of a cauldron or bar graph type display.

Put a radar just above the play area to indicate how far away the nearest construction machine is. The idea is that you creep up behind it and ram it senseless, rather than shoot it down – but they can shoot you.

I've used a really simple radar with a white dot at one end to give your position, and a blue dot to give the relative position of the machine.

Started on some ideas for weaponry selection as well: Decided that selection will be based on a computer visual of the selected weapon in icon form. (Icons? This calls for the designer.)

Came up with a few simple graphical representations of some weapons. This is far more effective than drawing a scaled down version of the weapon itself because so much detail is lost. For example, rather than attempting to draw an acid bomb, I drew a couple of test tubes instead.

Went one better and used a scrolling selection rather than the original pop-up style. It uses the same principle as the scrolling message routine in the menu, but on a much smaller scale.

Obviously, having such a sophisticated weapon selection will prevent you from accessing weapons as quickly as normal, but I think that this is where a bit of reality comes into effect:

If you select a ridiculously powerful and complex weapon, it is going to take a vital second or two to initialise and load it, instead of being handed to you on a silver plate, as is so often the case.

Oh brilliant! I knew this would happen. The Basic assembly has clashed with the code and the Beeb refuses to have anything to do with assembling in general. Need more memory. Changed the assembly technique slightly to allow for this.

The program assembles to screen memory and then saves itself to disc. A small program is then run which copies the code to its starting position and runs it. Of course, it is copied over the top of some of the Basic program but that can be recovered from disc.

There was actually a slight problemthe

first time. I unintentionally copied the code to the wrong location and my disk drive machine-gunned the discs – I've never moved so quickly! The main disc is corrupt but the back-up appears to be intact. This method takes a tiny bit longer than before but its worth the wait what with more memory and stuff.

This month also saw the birth of what will eventually become the onboard computer for navigating through the universe. The idea behind this is that it reports the pod's status back to the player and gives any relevant warning messages.

It is also responsible for running other indicators such as the radar, so one too many scrapes with the surrounding objects could cost you the radar as well as the status reports.

The text will be superimposed over the main play area using a small character set. This is because using a Mode 5 character set would look disgusting and take up too much room.

Designed a simple character set on the much-used editor and then set about writing a simple routine to read a message and print it on-screen in the new style.

Seemed to perform quite well, but it wasn't as nice as I first thought. To give it more of a computer style, I altered the code a bit to make it print up one character every few frames, rather than all at once – and the addition of a flashing cursor really did the trick. I've left it printing up spurious messages for now, but it won't be long before it's in full operation.

As Christmas is just around the corner, I'm having to do more work this month to make up for any lost programming time. Managed to get some objects on the boil, such as the transporter and a few lumps of the rock that contains the much needed Arionite.

These objects are stationary and are located on the radar screen as little dots, but I have also allowed for those objects which float around and do nothing except get in the way and also the homing mines which will chase you around the universe.

I've noticed, though, that all these objects seem to make the universe appear rather small.

a game DECEMBER

December...

Carried on with last month's work a little by placing more lumps of Arionite around the universe. I wasn't doing this for the game layout so much, but more to see how many objects I can have on the move at one time.

The net result wasn't particularly impressive either: I managed to squeeze in seven objects before the game slowed down.

Seven? That's just six rocks and one transporter! The game seems OK at the slower speed but travelling at maximum velocity causes problems. I know it's not the sprite displayer simply because the game slows whether there is a sprite on screen or not.

Looks like a bit of optimisation and general program modification is called for...

It took me several days of tinkering and fiddling before I found a much, much better way of doing it all. I think it has taken this long mainly because I couldn't face the fact that the old way was incredibly clumsy. Nevertheless, I have another method which I shall put to the test.

The old way continuously calculated and recorded the effective screen position of the object – using X-Y co-ordinates – so that the program knew exactly where to put it once it did appear. This is a criminal waste of CPU time as there's really no need to constantly calculate this at all. The new way simply calculates the screen position only when the object is in the screen area, and then prints it. Obvious, really.

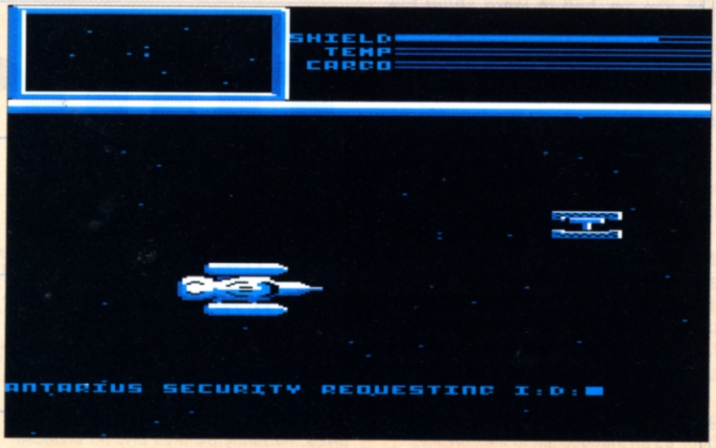
I tidied up a few more loose ends before continuing and it works like a charm – I'd like to find its new limitations some time...

Spent more time on the graphics editor this month. Have edged off the radar viewer with a thicker surround, as opposed to the red line that I'm so used to.

Also tried to come up with some designs for the time machine itself, but couldn't find anything good enough to be used in the planet sequence as well. After a lot of thought I decided that two ships would be necessary, one for the space sequence and another for the planet.

It seems logical really, as the original idea of the transporter was for a shuttle route to transport the machines – responsible for building the planet of Antarius – to and from the building site. Came up with a reasonable design for the time machine, but decided that something had to be done about that red. It just doesn't fit any more.

Made a slight alteration to the colour palette, as I found cyan to be a good match with the existing white and blue hues. It makes shading an awful lot easier too. Finished up with what I hope to be the final design – a machine to travel through both space and time... and not look too silly flying backwards either.



This brought on a nice idea for the opening sequence. The initial idea of the time travel experiment involved accelerating a craft down a narrow runway. At a certain point the craft was to be sent back in time by three seconds, only to appear at the beginning of the runway.

The idea behind this experiment was to see if the machine ever reached the end of the runway.

However, instead of programming in three seconds, three hundred years was entered by mistake, and your craft appears in the middle of the construction site for the planet and so on. The designed ship will match this very well, and will generally give a very dramatic entry into the game.

Some time later...

Installed the collision detection between all objects in the universe and the craft. If contact is made with a rock the craft will still be able to pass over it, but will be slowed down a great deal. Your shield level will also deteriorate, once I've put it in.

Originally I had the craft bouncing off everything but it looked a bit silly and unrealistic. Grinding your way across a rock makes it seem more dangerous, I think.

Updated the instrument panel with a set of bar graph indicators. They will be used to indicate shield deterioration, rock temperature and also the amount of cargo which has been taken on board. The rocks contain Arionite – the lifeblood of the time machine – which can be collected by shooting and ramming them.

Changed the collision detection slightly to differentiate between the rocks, the transporter and other such objects. The basic idea is that you have to completely fill the cargo hold with Arionite before you can use the transporter. So if you pass over the transporter with enough Arionite you will be whisked away to the planet, otherwise nothing will happen.

Invented a couple of new objects for the universe. The first is a kind of lookout point used by the construction machines to make radio contact with any unidentified craft in the area.

If identification is not recognised and the warnings are ignored, another object is introduced to the surroundings. It's called a S.A.D. missile (Seek And Destroy) and being hit by one of these will have a devastating effect on your shield.

These lookout towers have scouts which fly around the universe informing the towers of intruders like yourself. If contact is made with them they too will shoot you, but will also steal your cargo of Arionite. Great!

Work has ground to a temporary halt for Christmas and I doubt any more work will be done before the New Year – I must think of a name for this thing. January looks set to be a month packed with more creative and colourful ideas, which spark off even more creative and colourful questions:

- *Will there be enough room for the planet sequence? Or will it just turn out to be a souped-up bonus round? Will he think of a half-decent name for the game? All will be revealed?*

Fancy filing

File handling boring? Not when you learn how the professionals do it, as Terry Blunt discovers

Product: File Handling for All
Price: £9.95
Supplier: Beebug, 117 Hatfield Road, St Albans, Herts AL1 4JS
Tel: 0727 40303

IT is probable that some of you, like me, had to learn about file handling the hard way, gleaning information piecemeal from a wide variety of sources, as your needs exposed the limitations of your knowledge.

Now a book from Beebug aims to correct this situation by going step by step from first principles through the complexities of professional file management.

The book has over 144 pages of description, examples and discussion. and by the time you have worked through it you should have the principal tools and understanding for designing anything from a simple address book up to a sophisticated relational database.

However, despite all the information given, the authors correctly describe the book as an introduction to file handling.

Initially it concentrates on explaining the basic file handling commands, for opening and closing files and storing and retrieving data.

Later chapters build on this, explaining simple serial files, records, linked lists, pointer systems. There is a chapter devoted entirely to searching and sorting – probably the commonest and potentially most time wasting file activities. Hashing, empty record lists, index files, all are covered in detal.

Although written for the whole of Acorn range, the authors point out that there is much that is relevant in any computer environment. In order to maintain such wide compatibility, no use is made of the superior features of the Archimedes Basic 5.

However, the authors point out that some of the principles outlined in the later chapters actually take you beyond the capabilities of the Model B and even stretch the Archimedes.

Unlike some other works, the authors make full use of the filing system commands. As well as the more usual INPUT# and PRINT#, BPUT# and BGET# are explained and used extensively. Some of the low level filing system commands are also explored, including their relevance in a network.

The program examples show good modular design but the authors make little attempt to advise on programming itself. They seem to take the view that you should be a reasonably proficient programmer before tackling file handling, or should learn such techniques elsewhere.

This results in an uncluttered read and you are not likely to get lost following unimportant side issues.

This is not the sort of book to browse through. The style is little terse in places but this is reasonable as it treats the subject matter quite seriously. There are no jokes, no funny pictures and no unnecessary repetition.

There are notes and references to two database systems that Beebug developed themselves. One, called Filer, is available on disc separately along with all the program examples.

Reading the book and looking at the programs, particularly Filer, gives interesting insights into the practical implementation of the subject matter.

Finally there are appendices with information about machine differences, titles of recommended additional reading, and some information about Beebug and the other services the company provides.

Summing up

This is a useful, well written book, benefitting from the obvious experience of its authors, both in the field of programming and the publishing world.

Growing

Product: DTP seeds
Price: £8.45
Supplier: 4Mation, Linden Lea, Rock Park, Barnstaple, Devon EX32 9AQ
Tel: 0271 45566

DTP is partly a mechanical process and partly a creative one. The mechanics are provided by the software, the scope for creativity lies in design.

Design is all around you and in this book Mike Matson invites you to tune in to its subliminal effects, assimilate its secret power and then harness it for your own ends – though he puts it rather less pompously.

Stated more simply, examine the book and borrow what you fancy, in the same way that he freely admits to having borrowed from the real world.

The seeds in the book's title are ideas, and within its pages are a positive profusion of them, ranging from basic thoughts on page layout to a complete set of corporate image business stationery.

Very much to the fore is the thought that you have to reach out and grab the reader's attention – and then hold it until you have got your message across.

So, among other things, you find examples of covers and front pages, school stationery, invitations, advertisements and posters, all bristling with interesting hooks and devices.

Some of the examples are accompanied by brief explanations of what thoughts lie behind the features and what they are trying to achieve.

There is also a section on headers and footers – the topping and tailing of pages that help set the scene – and a large selection of logos and ways of adding emphasis.

Many of the pages exhibit flashes of humour, which is something that appeals to my well-trained sense of the absurd. I

kit

Bruce Goatly seeks to reap what others have sown

particularly enjoyed some of the ideas in the *Luigi Ices* graph and the *Silly games* flyer – banana stacking may or may not be a genuine New Zealand sport, but it deserves to be encouraged.

What I like about the book is that it isn't just a clinical exposition of theory, it has the courage to get its hands dirty and present the evidence for you to sift and winnow for yourself. This is in the best tradition of education – putting yourself on the line.

As it happens, some of the ideas didn't work for me, such as the use of Tamsin and Old English fonts all in capitals which are difficult to read, and the Orgo magazine cover which left me wondering *So what?*

But even these are useful because they stimulate thought about what works and what doesn't – and they are a reminder that design is not an exact science.

Although there is a section on page layouts, the examples relate to magazine and manual-type publications. There is nothing specifically on book or booklet page design, where balance, continuity and sustained legibility can be important.

Each page was prepared with 4Mation's Poster program and the book is a good advertisement for what can be achieved with it. Much fun seems to have been had in putting it together and I found it rewarding to study.

If any of my future DTP efforts come out bearing a resemblance to some of the examples in this book then I'm sure Mike Matson will take the complement and forgive me.

Summing up

Although it comes from a company subtitled Educational Resources, I'm sure that DTP Seeds will find use in more than just the school environment. Anyone who aspires to DTP work will find things here to spark their imagination.

Arc under

IT is unfortunate that this article actually needs to be written at all. The days are gone when an Archimedes user could smile smugly on reading about viruses wrecking PC networks throughout the world.

We are, alas, no longer immune. Viruses on the Archimedes are rearing their ugly code in public domain utilities and professional software. And bulletin boards are a perfect breeding ground for the beasts.

Christmas of 1990 produced a sick surprise for two users who powered up their Archimedes machines to discover the following message:

Hi, I'm the ghost of Christmas Future. I have infected 56 files and on the first of January 1991 I will defect your hard disc drive. Enjoy the rest of your Christmas.

You have six days.

One of these users had caught the virus and, by sending a disc to his friend, had infected him also. For the next six hours they sat at their keyboards and phones.

After finding the virus code in one of the infected files, they set about writing a program that analysed every file on their hard disc, searching for a symptom that the virus produced. The program then stripped the virus code out and moved on – 56 files later the computer was turned off.

Sadly, this was only the first of their problems. How many discs in their collection were also infected? How many other people had they inadvertently sent the virus to?

Be afraid, be very afraid...

Malicious computer programs are very widespread and companies are established just to deal with the information loss and corruption caused by them. Trojan horses, logic bombs, viruses and worms are all drifting into the micro user's vocabulary.

A Trojan horse infects by deceit. These programs, inspired by the legendary wooden horse built by the Greek army, have a friendly guise and then run their more sinister coding. The program will act as expected, but in the background it will infect as many files as it can.

Late in 1989 a disc was sent to more than 25,000 IBM users claiming to be a test program that could assess the user's exposure to AIDS. The test was on the disc – and so was a Trojan.

As soon as the test was run the hard disc was infected and a blackmail message appeared on the screen, politely asking for cheques to be sent to an address in Panama.

All the data, and every file on the machine, had been encrypted and, moreover, as most IBMs hold their operating software on disc, the AIDS Trojan had effectively taken control of the entire machine. The police were alerted as was computer virus researcher Jim Bates, who works closely with them. Within seven days Bates had written and distributed an antidote. The picture is not rosy though, Bates claims there are now more than 300 IBM viruses, some of which are disguised as anti-viral software packages, others invisible until it's too late.

Logic and time bombs

A logic bomb runs its background program when triggered by a particular event. This could occur by running a piece of software, or even when a certain disc is inserted.

A similar nasty is the bomb which runs at a particular time. For two months during 1987 a vicious program copied itself on to personal computers at the Hebrew University in Israel.

By chance, a student called Yuval Rakavy discovered that certain library programs were growing longer with no apparent reason. On further analysis he discovered code that would slow the infected computer down on certain Friday the thirteenths. It would also cause every file to be erased on Friday, 13th May 1988.

Rakavy wrote a vaccine that detected the time bomb and deleted it. Due to a virus counter-measure, clock adjustment would have been futile.

Biological viruses can be held responsible for anything from a cold to AIDS and maybe even certain cancers. Though they aren't biological, computer viruses can be equally devastating and the comparison is very apt.

A virus is not content with infecting once, it will proliferate by infecting every file on every disc, on every machine it is in.

The virus transmits by attaching itself to a program. When this program is run, the user unknowingly loads the virus into memory. The infection now starts.

Every file that is encountered by the virus will be infected with a replica of itself.

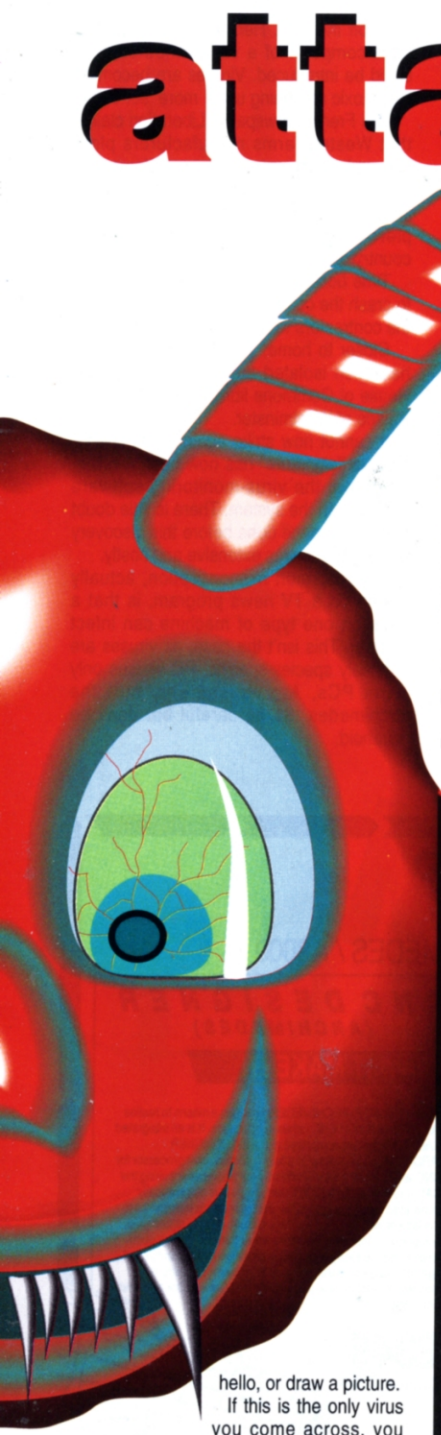
In a closed system, eventually an entire hard disc can become infected. Whenever a disc is put in the machine, this will also become infected.

Any other computer that disc is inserted into, whether loading any of the programs or not, will also become infected. This is how one of our Christmas friends infected the other.

Some viruses are written by egotists to demonstrate their programming skills and may simply produce a message saying

attack

Clive Gringras warns of the virus peril and explains how to combat it



There is no denying that this article may provide ideas for sufficiently knowledgeable "technopaths" to write a new virus. Hopefully, the description will also be constructive in causing similarly skilled users to write protection systems.

Arc viruses

The theory that if, as an Archimedes user with no hard disc, you are immune is a very dangerous myth. Firstly, from a social aspect, if you use your machine to send software to others who have hard discs, you are simply acting as a carrier.

Also, if you are fortunate enough to upgrade to a hard disc, you'll probably fill it with infected programs. Everyone needs to be very careful, everyone is responsible.

Most viruses on the Archimedes make use of the Risc OS "!" files. These "applications" are exploited because of their inherent structure. Each application directory may contain a !Boot file which usually have the type Obey, and the micro does just that.

On seeing any application, the micro searches inside the directory for a !Boot file. If there is one, it is run automatically, without the user even double-clicking on the icon to run the program. Simply looking at the catalogue of the disc is enough.

One may ask why the Archimedes does such a suicidal thing in view of its potential use.

The !Boot file generally is only used to load in sprites so that the application has its own icon and sometimes to set up file types. This is where most Archimedes viruses attack. The most commonly known, but thankfully most docile of Arc viruses, is the Extend one.

It infects the !Boot file but is able to be detected and fooled by using an aspect of its own coding. Unlike the postman, it never knocks twice.

Once a !Boot file has been infected it will hello, or draw a picture.

If this is the only virus you come across, you are one of the lucky ones. Other strains have no reason to exist other than to infect as many machines as possible and produce the maximum damage.

To illustrate the threat of the virus on the Archimedes we have to have a closer look at how these programs work. This publicity cannot be exploited to reconstruct a virus except by a programmer who already has the skills to write one.

Halting the spread

Virus protection is a difficult business, and no matter how powerful the anti-virus programs, there is always the risk of infection. The Archimedes market is currently unaware of the gravity of the situation and hence the virus killers available are limited in their power, and in certain cases rather naive.

There is a vast amount that can be done to prevent the initial infection by even the most novice user.

If all directories beginning with a ! – applications – are opened by double-clicking on the icon while holding down a shift key the !Boot file can be examined for symptoms by dragging this file into Edit.

If all the file contains is an Iconsprites .!Sprites command or something similar, the file is superfluous. Risc OS will automatically load in !Sprites if there is no !Boot file anyway.

However, there is no need to delete the file, just rename it as Boot. If the !Boot did more than thought initially and the program fails to work properly, simply rename the Boot file back to !Boot.

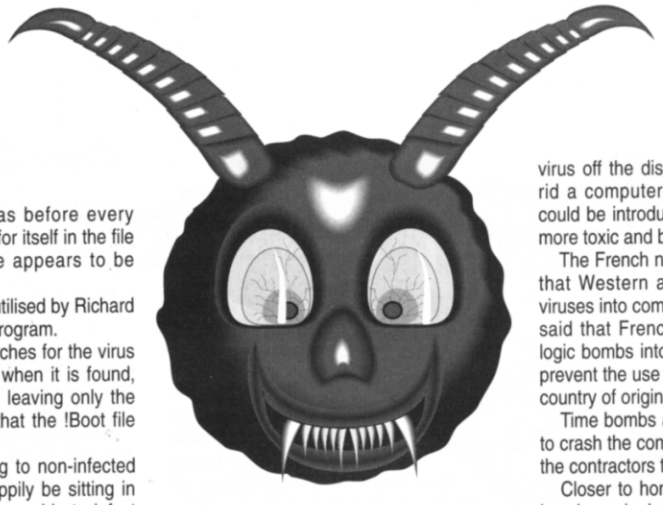
Another prevention routine is to lock all !Boot files using the Filer menu. Most viruses will automatically unlock the files they want to infect, but it may catch out the odd one or two. A clue that infection has occurred can be that a locked !Boot file is no longer locked or that the date stamp on a !Boot file is very recent compared to the other files inside the directory. To see these date stamps, select Full Info from the Filer Display menu.

Network users should never catalogue a new disc on a network machine – always take a look at it on a free-standing machine first. Where possible use it only on the separate micro for a while before transferring. You could also seal up the floppy drives on most of the machines too.

If a virus is found, don't panic! Try not to look at any more applications by opening any more directories or cataloguing more discs. This will spread the virus further and make the eradication more troublesome.

As a virus, once known, is relatively easy to deal with, it is a good idea to rename the offending !Boot file to Virus and copy the whole application onto a blank disc and pop it into the post with your address and the word VIRUS on the disc label to *The Micro User*, who will forward it to antidote-researchers.

There is one ray of hope for the Archimedes. Experts in the field are reasonably satisfied that, because Risc OS is held in rom and therefore unalterable, it is likely that a complete defense against all viruses may be possible on hard disc systems – and even floppy systems can be well protected.



not be infected again, as before every infection the virus checks for itself in the file and moves on if the file appears to be already infected.

It is this feature that is utilised by Richard Lloyd in his Extend killer program.

Richard's program searches for the virus in all the !Boot files, and when it is found, deletes the nasty coding, leaving only the code that tells the virus that the !Boot file has been infected.

It also adds this coding to non-infected files so the virus may happily be sitting in your computer, but will be unable to infect another !Boot as it thinks they are all already infected.

The extend virus actually doesn't do anything really naughty, but a section of the coding that counts the number of infections is an indication that a logic bomb was intended to be added.

The most cunning Archimedes virus to date is a Trojan Horse that was being written by a colleague. The program was a user-friendly, quick, C compiler. However, as well as compiling the source code, it also added a virus to the beginning of the object code.

Thankfully, this program has stayed firmly locked in his disc box as it was written purely as an academic exercise. But the potential is worrying.

Ongoing battle

The Archimedes is likely to follow the same scheme of events as the IBM world. Virus killers and disc cleaners will be written to combat known viruses. Meanwhile, new viruses will appear that are immune.

Viruses have appeared that change their "appearance" with every infection, making spotting them more difficult.

Some have been written that actually infect any program that tries to prise the virus off the disc. Hence, in an attempt to rid a computer of a virus, another virus could be introduced. Viruses are becoming more toxic and being used more seriously.

The French newspaper Liberation claims that Western arms manufacturers plant viruses into computer weapon systems. It is said that French arms contractors install logic bombs into the controlling software to prevent the use of the hardware against the country of origin.

Time bombs are also said to be installed to crash the computer after a time, enabling the contractors to charge for servicing.

Closer to home, the Nomenklatura virus has been isolated and removed from the House of Commons library computer in the Palace of Westminster.

It cannot now strike again as its phenotype, or "signature" has now been incorporated into the virus-monitoring software operating in the system. There is little doubt that the damage done before this discovery and expulsion was extensive and costly.

One common misconception, actually stated on a TV news program, is that a virus on one type of machine can infect another. This isn't the case, as viruses are definitely species-specific. PC viruses only harm PCs, Arc viruses only hurt the Archimedes. So be careful but don't be paranoid.

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Terry Blunt gets to grips with the fascinating world of computer control

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WITH Acorn's reputation for interfacing on the Model B, it came as rather a shock to me that there was so little apparent access to the Archimedes and even less on the A3000. However, now podules for both micros provide the User and Analogue ports that were so familiar with the earlier micros.

There was also precious little written material detailing how to make use of these interfaces, and what there was often proved to be rather cryptic.

However, this gloomy situation has changed with the arrival of HCCS Associates' new book *Control on the Archimedes*. It is aimed positively at the education field, but is also clearly relevant to the home electronics enthusiast.

The book goes wholeheartedly for the hands-on approach. There are example programs and circuits on almost every page, and suggestions for further development.

Teachers wanting to set up experimental projects for their students will find the work well presented, and with more than 160 pages there is plenty to chose from.

The author covers a mix of electronics and programming that should allow anyone with only a basic grounding in both subjects to work through the material.

Those of you with restricted budgets will be pleased to know that all the hardware designs are relatively cheap and many components are re-usable from one project to the next.

Care has been taken to protect the interfaces by describing a set of buffer units, both commercially made and home built. Personal safety is assured, as all the designs are for low voltages and are chiefly battery powered.

If, however, you are really proficient in the electronics field, I can see no reason why relays couldn't be used for driving mains powered equipment, even though the author doesn't recommend this.

As well as demonstrating how the User and Analogue ports can be controlled, you are shown how to make some use of the printer port, but as an output only. Well-structured example programs are provided both in Basic and Logo.

There are programs and hardware modules for security systems, greenhouse temperature controllers, motion detectors and even a series of program segments that develop into a quite respectable remote-controlled buggy.

The author develops library modules to integrate with your own control programs. These consist of procedures and functions encapsulating the actual machine calls.

They are mainly Osbyte calls, but there is one very short piece of Arm code. Were it not for this, the book would almost be compatible with the older eight bit micros. In any case, little change would be needed in most of the library routines to ensure compatibility.

The section on Logo in the later part of the book is particularly relevant, being an accepted teaching standard, and the author gives a good account of the structured design philosophy of this language.

The Logo programs are even easier to understand than those written in Basic, although none are particularly taxing in any case.

Along with a reasonably detailed index, there are a number of useful appendices, including a list of hardware and component suppliers, library routines, and the map of the 6522 VIA chip – the heart of the user port.

Additional support for the book is available in the form of a disc with the library routines in both Basic and Logo, and a kit of components for many of the interface units is described. Finding the right level for a book of this kind is always difficult. You have to appeal to a wide range of ability. I would suggest that it is best suited to relative beginners and should fit into a school environment quite comfortably. However, experienced programmers and electronics whizz-kids may find the style a little stuffy in places.

Summing up

This is a well written book, full of useful ideas given that you need to have an I/O podule. I would have liked a little more information on using the printer port though, as this can be used without an interface podule.

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Home Accounts*	£36	Purchase	
Stock Manager*	£53	Ledger*	£53
Nominal Ledger*	£53	Reporter	£29
Ancestry	£59	Mailshot*	£29
System Delta+	£55	MultiStore	£195
System Delta + Reference Manual			£25
Order Processing/Invoicing*			£53
School Administrator			£118

** Requires System Delta*

NEW Business Accounts Packages
Nominal Ledger, Order Processing/Invoicing, Purchase Ledger, Sales Ledger & Stock Control
Price: **£78** per Module or
£299 for complete package

ULTIMUM – Archimedes A3000 Podule Racking System

THE ONLY LOGICAL WAY TO EXPAND YOUR A3000 COMPUTER

The accepted standard for Archimedes computer expansion is the Acorn Podule, designed initially to fit the old 310, and also for the later A400 and A400/1 series micros. The podules fit inside these computers up to four at a time. The A3000 is the little brother of the family, but can only have one podule at a time, plugging into the back of the computer.

Other attempts have been made to expand the A3000 by trying to introduce a 'mini-podule'. This is impractical for many reasons, amongst which is the reluctance of manufacturers to produce them. Nobody wants to re-design podules already produced. Some cannot be produced on a 'mini-podule' as they are far too complicated and simply wouldn't fit.

Watford Electronics listens to the demands and requirements of its customers, and we are glad to say that we have come up with the only real solution to the A3000 expansion problem. The ULTIMUM Podule Racking System allows up to three FULL SIZE standard Archimedes 300/400 series podules to be fitted to the computer. In addition, there is also provision for a hard disc drive and a podule to be fitted internally.

Since the ULTIMUM Podule Racking System takes proper full size podules, you will be able to use any of the currently available peripheral equipment, from companies like Computer Concepts, Armadillo, Acorn and of course, our own brand.

Fitting the podules to 'ULTIMUM' is simple. They are neatly fitted inside the metal case of the rack, avoiding the previously untidy method of hanging the podule off the back of the computer, risking damage to both, it and to the computer.

'ULTIMUM' has its own power supply, so no strain is put on the A3000 power supply. There is also an IEC mains output socket for an Acorn type monitor so reducing the number of plugs required to go to the mains. The ULTIMUM is rigidly clamped over the top and under the computer, and allows direct access to the floppy disc drive and reset button, rather than obstructing access as on other systems. One can also place a standard monochrome or 14" colour monitor (even a multiscan type) safely on top. The mounting method employed is so firm that the computer could even be safely transported without the assembly falling apart.

Price: £125

Archimedes A300/A400 SCSI Hard Disc Offer
(while stocks last)

100MB Hard Disc Upgrade complete with Controller card, Cables, Formatter and Manuals

RRP: £1030
Offer Price: £499

Archimedes to BBC Serial Link Mk 2

Using this simple data link, it is possible to solve all your BBC to Archimedes data transfer problems. The kit is supplied with a disk, and the necessary cable to connect the two computers.
New RISC OS Version **Only £15**

Archimedes 5.25"/3.5" Disc drive Interface

With this interface it is possible to connect almost any 5.25"/3.5" disc drive with its own power supply to the Archimedes. Upto 4 disc drives can be connected. Fully Buffered Board. NO SOLDERING is involved. Supplied complete with necessary lead.
Only £21

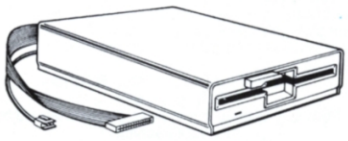
Special Education Prices

All education establishments qualify for special education prices on micros, etc. Please write in or telephone (0923) 37774 or 50335 for written quotation.

BBC MASTER

MASTER 128K Micro incl. Acorn's View, Viewsheet, ADFS, BASIC Editor & TERMINAL plus FREE OFFER (see below) **£399** *(carr £7)*

FREE OFFER



A 5.25" Double Sided, 40/80 track switchable 400K Disc Drive complete with cables and a Utilities disc incl. 2 games, plus

Gemini's OFFICE MATE & OFFICE MASTER packages on Disc consisting of: Database, Spreadsheet, Beebplot graphics. Accounts packs: Cashbook, Final Accounts, Mailist, Easyledger, Invoice & Statements, Stock Control.

FREE with every BBC Master purchased from us during March

ADD-ONs & ACCESSORIES

Turbo 65C102 Add-on Module			£115
Econet Module for the Master			£45
Twin ROM Cartridge for Master			£9
Quad ROM Cartridge for Master			£14
Master Reference Manual I		(No VAT)	£14
Master Reference Manual II		(No VAT)	£14
Master Advance Ref Manual		(No VAT)	£17
64K Upgrade Kit for B+			£32
Acorn 1772 DFS Kit complete			£49
ECONET Upgrade Kit for BBC B			£42
ALL ECONET UPGRADES Available			
ARIES' IEEE Interface for BBC B & Master			£238
Morley Teletext Adaptor with ATS Rom			£99
Filestore E01S	£899	Filestore E40s	£749
Filestore E60S	£949	Ecolink	£270

(Carr. £2 to £7 depending on the weight)

SPRING HANDS-ON OPEN DAY

The Date:	Sunday 7th April 1991
The Time:	10.00pm to 4.00pm
The Place:	Jessa House, 250 Lower High St, Watford
The Event:	Watford's ever popular Open Day
The Sponsors:	The BBC Acorn User and The Micro User magazines

Another chance to bring out the family and make a visit to Watford Electronics to watch, to learn, and talk to other like minded enthusiasts, experts and novices on the subject of Acorn BBC and Archimedes range of computer systems.

See displays and demonstrations of the latest in Acorn Computer technology from the experts.

- **BBC Archimedes A3000**
- **Archimedes A400 series**
- **BBC Master 128 micro**
- **Watford Aries PCs**

Also appearing:

- **Colton Software:** Pipedream 3
- **Minerva:** Atelier, System Delta and various business softwares
- **Silicon Vision:** RISC BASIC, Solid CAD, Solid Modeller, etc
- **Superior Software:** Various Games & the New Launch 'Archimedes Speech Utility'
- **Computer Concepts:** Laser Direct & Impression DTP
- **Panasonic UK:** Full range of Panasonic printers
- **TAXAN UK Ltd:** Full range of Multiscan Monitors

Technical Support

- Watford Electronics own technical team will be available to discuss problems and offer advice on Acorn computer equipment.
- The Micro User's Mike Cook of the 'Beeb Body Building course' fame, will be there to help and advise on BBC related matters.
- Gordon Taylor, the renown Archi 'Guru' and technical writer will be available for discussions on all things Archimedes including Computer Concepts' Impression DTP package.
- Representatives of Acorn Computers will talk about proposed new products, and listen to your suggestions.

Educational Support

A private area allocated to the specialist in education will be provided.

- Peter Howes of Acorn Computers will be at hand to discuss educational requirements for both, Parents & Teachers.
- Ex-teacher and Micro User's Consultant editor, Peter Davidson will be on hand to talk about current trends and requirements in the Acorn Computer educational sector.
- Nazir Jessa, Watford Electronics Managing Director, will be happy to discuss special deals and packages for educational establishments and parents.

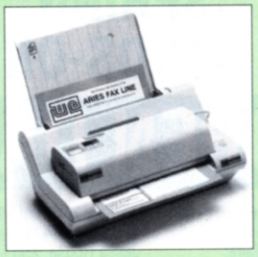
Finance Available

Purchases can be made at the Open Day and Instant Credit deals will be available for up to £1,000.

FREE REFRESHMENTS will be served throughout the day

Continued→ → → → → → → → →

Archi A4 Scanner



This new A4 image scanner from Watford Electronics is supplied complete with ROM based podule software. Features provided include facilities for zooming in on an image and inverting the image in X and Y directions, saving and printing of the sprite created. Interactive help is supplied using the !HELP application on the Acorn applications discs.

The 216mm scanning width can cope with both desktop scanning of single sheets, photographs, diagrams, etc., with its fast ten page automatic document feeder, but it can also detach from the feeder to become a convenient hand-held full page scanner for larger documents or pictures.

Scanned image control can be freely adjusted in increments of 10 dots per inch from 100 up to 400 dpi resolution with 64 levels of grey scaling. A built in shading controller and manual brightness control achieve optimum image clarity.

Unlike some scanners, which use a red light source, the Watford scanner uses a yellow/green source which vastly improves the light/dark contrast, thus eliminating the effect where any red-based colours are faded down to white and so do not show up in the scanned image.

All these features and facilities combine to make the Archi Page Scanner the fast and convenient way in which to add that extra impact, interest and clarity to documents, reports, instruction sheets, manuals, news letters, etc., from your Archimedes DTP package.

Introductory Prices:

Archi A4 Scanner	£349
Sheet Feeder for above	£95
Scanner + Sheet Feeder	£419

Z88 Portable Micro

£189

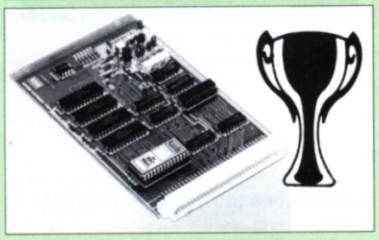
FREE

With every Z88 purchased from us, we are giving away absolutely FREE, a Z88 to BBC Interface Link, 4 rechargeable batteries and a compact Mains Battery Charger worth £38.

Z88 ACCESSORIES

- 32K RAM Pack or 32K EPROM Pack **£18.00**
- 128K RAM Pack or 128K EPROM Pack **£42**
- 512K RAM Pack **£175**
- Z88 Eprom Eraser Unit **£33**
- Z88 Spellmaster for Pipedream **£51**
- Z88 Carrying Case **£8**
- Z88 Computing Book **£9.95**
- AA Nicad Rechargeable Battery **£1.50**
- Battery Charger Compact & Fast **£6**
- Z88 Serial Printer Cable **£8**
- Z88 Parallel Printer Cable **£25**
- Z88 to Archi Link **£15**
- Z88 to BBC Link **£20**
- Z88 to PC Link II **£30**
- Z88 to Macintosh **£52**
- Z88 Mains Adaptor **£9**
- Z BASE **£56**
- Z TAPE **£42**
- Z TERM **£42**
- Z88 Modem **£149**

Archimedes Real-Time Digitiser



Now supplied with NEW RISC OS Version Software

Watfords' Archimedes Video Digitiser is the most sophisticated digitiser ever designed for a micro. It provides a fast and flexible means of capturing images from a video camera or recorder for display and manipulation on the Archimedes range of Micros. Off-air televison signals may also be digitised via a video recorder or TV tuner. Please write for further details.

Price £175

A Set of Colour Filters for colour image grabbing using a video camera	£16
New Risc-OS Software Upgrade	£39

Archi Graphic Tablet

The Archi Graphic Tablet offers performance and accuracy comparable to other tablets priced at well over £400, and has the useful addition of a liftable cover, which can hold tracing material or menu templates securely. The package is supplied complete with sophisticated Archi software. (Now, fully LinCAD compatible. Recommended by Linear Graphic).

(FREE this month, PC Mouse Drivers & Art package)

(Now, fully LinCAD compatible. Recommended by Linear Graphic).

Special Price £225

(Price includes Tablet, Leads, Software & Puck)

Stylus Optional Extra **£29**

Disc Plonker Rack

When using ones micro, there is a tendency to have more than one Disc on the desk. This exposes them to the harzards of fingerprints, scratches, dust, coffee and an untidy desk. Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. Holds up to eight 5.25" discs.

Protection at Only: **£2**

Acorn & Watford DFSs

- Watford sophisticated DFS ROM **£16.00**
- Watford DFS Kit complete **£69.00**
- We will exchange your existing ROM for Watford's ultimate DFS ROM at only **£12.00**
- DFS Manual (comprehensive) **£6.95**
- Acorn DNFS ROM **£17.00**
- Acorn ADFS ROM only **£25.00**
- Acorn 1772 DFS ROM Kit **£49.00**

(The single Density DFS system is now old technology. Like Acorn, Watford too have decided to replace it with the their more up-to-date 1770 DDFS interface. We have informed most of the software houses of this decision in order that they can ensure compatibility with our highly sophisticated and fully Acorn compatible DDFS).

Watford's MkII 1772

Single/Double Density DFS

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our Mk II DDFS Board with its 1770 Disc Controller, has been adapted to allow the use of Acorn ADFS as well. It also has all the commands of the Acorn's 1770 DFS, plus the added features.

Added features include:

- Acorn ADFS compatible – Use ADFS on our DDFS board.
- Tube host Code – No longer any need to have the DNFS in your machine to use Co-Processors, even the CoPro and Master 512.
- Auto 40-80 Track sensing – no need to fuss with 40/80 track switches (even works with protected disks).
- An extremely powerful 8271 emulation – ensuring compatibility with almost all software.
- New low profile – small footprint board.
- Fits with all third party ROM boards.
- Option to double the speed of file handling operations – BPUT and BGET.
- Operates in both single and double density modes.
- OSGBPB has been recoded, increasing still further the speed of file handling.

Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the disk – Ours allows both of these!

If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only **£39.00.**

- SPECIAL PRICE **£44.00**
- DDFS Manual (No VAT) **£6.95**
- We will exchange your existing DFS Kit for our sophisticated DDFS for only **£30.00**

Please note, as the MkII DDFS is a hardware and sofware upgrade, it is not possible for existing Watford DDFS users to simply exchange the ROM for the new version.

3M – Diskettes

3M – SCOTCH Diskettes with Lifetime warranty from Watford Electonics your 3M Appointed Distributor

- *10 x 5.25" S/S D/D 40T (744)* **£5**
- *10 x 5.25" D/S D/D 40T (745)* **£5**
- *10 x 5.25" S/S D/D 80 Track (746)* **£7**
- *10 x 5.25" D/S D/D 80 Track (747)* **£7**
- *10 x 5.25" 1.6M D/S D/D High Density for IBM XT and AT* **£11**
- *10 x 3.5" S/S D/D 40/80 Track* **£7**
- *10 x 3.5" D/S D/D 40/80 Track* **£8**
- *10 x 3.5" Double Sided High Density* **£15**

Top Quality 3.5" & 5.25" Diskettes

To complement our range of Quality Discs and Disc Drives. WE are now supplying SPECIAL OFFER packs of 10 Lifetime guaranteed discs. Each disc has a reinforced hub ring. Supplied complete with selfstick labels and a Plastic Library Disc Box.

- *10 x **M3** 3.5" D/S D/D 80 Track* **£7**
- *10 x **M9** 3.5" D/S High Density* **£14**
- *10 x **M4** 5.25" S/S D/D 40 Track* **£5**
- *10 x **M5** 5.25" D/S D/D 40 Track* **£5**
- *10 x **M7** 5.25" D/S D/D 80 Track* **£7**
- *10 x **M8** 5.25" D/S H/D Hi-Density* **£11**
- ***M2** 3" Double Sided* **£2.50** *each*

CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383

Quality Disc Drives from Watford

All our Disc Drives are Double Sided and will operate in both Single and Double Density modes. All 5.25" Disc Drives are 40/80 track switchable. For ease of use, the switches are front mounted.
Various UK "manufacturers" of disc drives for the BBC micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high qulity NEC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.
If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, are the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.
Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. ***Ideal for Schools & Colleges.***
When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space) your BBC Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with a Watford plinth. (Turn to the 6th page of our advert for the Plinths).
P.S. All our 5.25" Disc Drives with PSU are compatible with the Compact Micro. All you require is our special Compact Disc Drive cables designed by us.

Our Disc Drives conform to BS415

"Test Bureau Approved for Use in Education"

Type	Description	
	Disc Drive without PSU	
• CLS400S:	Single, 40/80 track 400K Double sided Drive	**£72**
• CLD800S:	Twin, 40/80 track, 800K Double sided Drives	**£142**
	Disc Drive with PSU	
• CS400S:	Single, 40/80 track, 400K Double sided Drive	**£82**
• CD800S:	Twin, 40/80 track, 800K Double sided Drives	**£155**

Special Cable to connect both 3.5" and 5.25" Disc Drives simultaneously to the BBC Compact £13

CLS400S Disc Drive & Mk 2 DDFS Offer

- The popular CLS400S 40/80 track switchable disc drive.
- Watford's popular Mk II DDFS Interface (allows up to 720K storage). Will run both in single & double density modes.
- A comprehensive DFS Operating manual

Bargain at Only **£119** (Offer valid until stocks last)

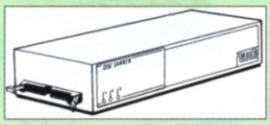
3.5" DISC DRIVE

These top quality 3.5" Double sided, 80 track, 1 Megabyte (unformatted each Disc Drives), are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc.

Type	Description	
	Disc Drive without PSU	
• CLS35:	Single Disc Drive, 400K	**£62**
• CLD400S:	Twin Disc Drives, 800K	**£109**
	Disc Drive with PSU	
• CS35:	Single Disc Drive, 400K	**£83**
• CD35:	Twin Disc Drives, 800K	**£126**

(P.S. CS35 is supplied in a twin case with a blanking plate to enable easy expansion to a dual drive at a later stage)

DISC DRIVE SHARER



(Ideal for educational establishments)
At last, a low cost alternative to the Econet system.Watford's Intelligent Disc Drive Sharer allows you to connect 3 BBC micros (model B, B+ and Master series) to a single or double disc drive. Running under any DFS or DDFS, this intelligent unit will automatically queue the computers. Each computer has a status light dedicated to it. If it is green you will get immediate access to the disk, and red means that you are next in line. The unit plugs directly into the disc drive socket on each computer and is powered by the mains. (N.B. Not for use with ADFS.)

Price includes 3 Cables OfferPrice: **£55**

Disc Drives in Monitor Stand

- **CDPM 800S** – Twin 5.25", 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC B & Master 128K micros. Supplied complete with integral power supply, cables and Utilities disc. The mains switch with neon On/Off light indicator, and the two 40/80 track switches are mounted on the front panel for ease of use.

£165

- **DP35 800** – Same as above except, one disc drive is a 5.25" and the other is 3.5".

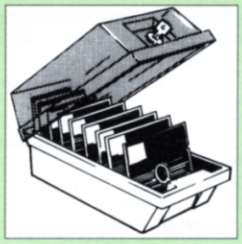
Price: £154

Floppy Head Cleaner Kit

The heads in floppy drives are precision made and very sensitive to dirt. The use of cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. it is very simple to use. Available in 3.5" & 5.25", please specify.

Price £4

Antistatic Lockable Disc Storage Units

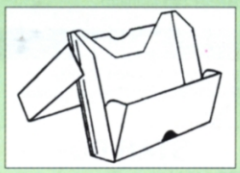


Gives double protection – Strong plastic case that affords real protection to your discs.
Antistatic helps avoid data corruption whilst in storage. The smoked top locks down.
Dividers and adhesive title strips are supplied for efficient filing of discs.

- **M35** – holds up to 50 5.25" discs **£4.95**
- **M85** – holds up to 95 5.25" discs **£6.95**
- **M25*** – holds up to 25 3.5" discs **£4.95**
- **M50** – holds 50 3.5" discs **£6.50**
- **M10** – holds 8 of No. 10 Data Cartridges **£15**

* Not lockable

Plastic Library Cases



Holds up to 10 x 3.5" Discs. **£1.50**
Holds up to 10 x 5.25" Discs. **£2.00**

Dust Covers (For our Disc Drives)

Single CLS (without PSU)	**£3.20**
Single CS (with PSU)	**£3.25**
Twin CLD (without PSU)	**£3.85**
Twin CD (with PSU)	**£3.90**

Disc Albums

Attractively finished in black leather-look vinyl. Stores up to 20 discs. Each disc can be seen through the clear view pocket.

£4

Special Bulk Offer on Discs

(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)

PRICES SLASHED

BULK PACK DISCS in lots of 100

Type	S-S 40T	D-S 40T	D-S 80T
• Without Sleeves 5.25"	**£30**	**£35**	**£40**
• With Sleeves 5.25"	**£33**	**£38**	**£43**
• 3.5" D/S D/D	**£29 for 50**	**£52 for 100**	

Continued→ → → → → → → → →

12 months FREE maintenance on site

Microvitec Monitors

- **1431** – Standard Resolution Monitor **£172**
- **1451** – Medium resolution, suitable for word processing in mode 0 **£215**
- **Cub3000** Medium Res for A3000 **£195**
- **1441** – High res, exceeds the capabilities of the BBC Micro **£359**
- **2040 CS** 20" Hi Res **£675**
- Dust Cover for Microvitecs **£5.50**
- **Touchtec 501 Touch Screen** **£239**

Multiscan Colour

- **EIZO** 9060SZ Low Radiation, Antistatic screen, Ultra Hi Res 800 dots x 600 lines. 0.28 Dot **£399**
- **EIZO** 9070S 16" Low Radiation .28 Dot pitch. As used on Archi 540/1 **£599**
- **PANASONIC** – 14" Super High Res. 0.29" Dot pitch, non glare screen. Built-in Swivel base **Special £349**
- **TAXAN** 770LR Low Radiation Multiscan **£386**
- **TAXAN** 775 Plus – 0.28 Dot pitch Ultra high resolution, anti-static screen **£386**
- **TAXAN** 795-A TRINITRON 0.26 Dot pitch 1024 x 768 Non interlaced **£455**
- **VIDC** Enhancer Board **£29**

(P.S. VIDC Enhancer board is supplied FREE with every TAXAN 795 Monitor)

Philips

- **BM7502** 12" Hi-res Green Monitor **£70**
- **CM8833** 14" Med. Res Colour Monitor **£173**

STAR BUY

- **PHILIPS 14"** Medium Res, dark glass, attractively finished Colour Monitor . A push-button switch toggles between Hi-Res monochrome green text mode and full colour display. (Please state the type of Connecting Lead you require).

ONLY £159

Dust Cover for Philips Monitors **£6**

(Securicor carriage on Monitors £7)

Spare Monitor Leads

BNC Lead for Zenith or Philips	£3
Skart Monitor Lead	£5
RGB lead for TAXAN Monitors	£3
Archimedes Colour Monitor Lead	£7.50

Anti Glare VDU Screen

These extremely effective, easy to install, 12" & 14" VDU screens eliminate harmful glare, improves contrast on colour monitors. Increases productivity in offices. A must for wordprocessor users.

£12

By popular demand, we are now able to supply refurbished and fully guaranteed, Acorn range of Micros.
(Please telephone for price & availability)

Be Satisfied Before You Buy

We have on display, various Micros, Printers, Disc Drives, Monitors, etc. Call in at our showroom to evaluate before you buy.

Concept Keyboards

Standard A3 Keyboard with BBC Software	£143
Standard A4 Keyboard with BBC Software	£117
Archi A3 Keyboard	£144
Archi A4 Keyboard	£118

FREE On-Site Maintenance

This month we are also offering at no extra cost to all our customers, 12 months, On-Site Maintenance on all Microvitec and Multiscan colour monitors, all Panasonic printers, and all Laser Printers, Roland Plotters and of course the full range of Archimedes micros. Should the machine fail, simply telephone the maintenance engineer, who will call in within 12 working hours. (Offer applicable only when bought at prices advertised in this advert. UK mainland only).

Hewlett-Packard Printers

- Desk Jet 500 **£368**
- Desk Writer **£485**
- Desk Jet Cartridge **£15**
- Paint Jet Colour **£625**
- Paintjet XL **£1155**
- Quiet Jet Plus **£376**
- Scan Jet Plus **£725**
- HP Think Jet **£240**
- Rugged Writer **£849**
- Paintjet Cartridges Black **£19;** Colour **£25**
- Desk Jet 500 256K RAM cartridge **£129**
- HP Epson FX Emulation Cartridge **£59**

HP Apple Talk Interfaces for

- Scan Jet **£299**
- Paint Jet **£55**
- Mac Interface for Scan jet+ **£1175**

Canon Bubblejet Printers

BJ 10E **£222** BJ300 **£355**
Cut Sheet Feeders: BJ10E **£54** BJ300 **£88**

Panasonic Printers

FREE with every **KX-P1081 & KX-P1180** Printers: A printer lead (please specify type required) and a Dump Out 3 ROM for the BBC Micro or 1,000 sheets of paper for other micros, please specify)

- **KX-P1081** 9pin 80col. 144/28 cps **£124**
- **KX-P1180** 9pin 80col. 192/38 cps **£129**
- **KX-P1123** 24pin 80col. 192/63 CPS **£166**
- **KX-P1124** 24pin 80col. 192/63 CPS **£185**
- **KX-P1624** 24pin 132col. 192/63 CPS **£305**
- **KX-P1695** 9pin 132col. 330/86 CPS **£310**

Above prices include FREE, Watford's 12 months on-site maintenance

Panasonic Accessories

Cut Sheet Feeders

KX-P1592/1595 (P32)	£175	KX-P1540 (P35)	£175
KX-1124 (P36)	£85	KX-P1180 (P37)	£79
KX-P1624/1695 (P38)	£124	KX-P1123 (P37)	£79

Buffers

P12	4K buffer Board for 1081	£55
P42	32K buffer Chip for 1592/1595	£16
P43	32K Buffer Chip for 1540/1124/1180	£16

Serial Interfaces

P17 P1081/1592 **£32** **P19** P1124/1180 **£55**

Citizen Printers

120D Plus	£99	124D Printer	£165
Prodot 9	£239	Prodot 24	£339
Swift 9	£149	Swift 24	£216

- Prodot Cut Sheet Feeder **£120**
- Swift 24 Colour Option **£32**
- Swift 24 Ribbons Black **£4** Colour **£13**

Star Printers

- **LC10** 9pin 80col. 144/36 CPS **£117**
- **LC10-II** 9pin 80col. 180/45 CPS **£139**
- **LC15** 9pin 136col. 180/45 CPS **£242**
- **LC24-10** 24pin 80col. 180/60 CPS **£163**
- **LC24-15** 24pin 136col. 200/67 CPS **£305**
- **FR10** 9pin 300/76 CPS 31K 16 fonts **£275**
- **FR15** Wide carriage version of above **£365**
- **XB24-10** 24pin 80col. 240/80 CPS **£360**
- **XB24-15** 24pin 80col. 240/80 CPS **£480**
- **XB-24** Colour Kit **£35**
- **LC-200** Colour 9pin 80col. 180/45 CPS **£160**
- **LC-24-200** 24pin 80col. 222/67 CPS **£195**
- **LC24-200** Colour 24pin 80col. 222/67 CPS **£230**

Star Accessories

Cut Sheet Feeder

LC10/200/24-10	£65	LC15/LC24-15	£125
XB24-10	£80	XB24-15	£139
LC24-200	£63		

Serial Interfaces

SPC-10 LC10; LC10-II; LC10-Col; LC15; LC24-10; LC24-15; LC-200; LC24-200 **£49**
8K Ser LC-200; LC24-200; FR10; FR15; XB24-10; XB24-15 **£64**

Paper Roll Holders

LC-200; LC24-200; LC24-200 colour **£29**

Buffers

32K Ram Card for LC24-10; 15 & 200 **£55**
32K Ram Card for XB24-10 & 15 **£55**

Ribbons

LC10; LC10-II; LC15	Black **£4;**	Colour **£6**
LC-200; LC24-200	Black **£5;**	Colour **£12**
XB24-10; XB24-15	Black **£5;**	Colour **£12**

Laser Printers

Canon LBP-4	4ppm	£690
Canon LBP-8 IIIR	8ppm	£1535
Canon LBP-8 IIIT	8ppm	£1410
Epson EPL7100	6ppm	£720
HP Laserjet IIP	4ppm	£659
HP Laserjet III	8ppm	£1035
HP Laserjet IIID	8ppm	£1575
Panasonic KX-P4420	8ppm	£675
Panasonic KX-P4450i	11ppm	£1079
Panasonic KX-4455 Postscript	11ppm	£1699
Qume Crystal Print WP+		£695
Qume Crystal Print Ser. 2		£1065
Qume Crystal Print Publisher 2		£1899
Star LP-8 III		£1089
Star LP-8 Star(post)script		£1225

Laser Toners

Canon 2 & 4	£55	Laserjet II & IIP	£55
Epson GQ	£18	Laserjet III	£75
Star LP-8	£69	Qume Crystal	£59
KX-P4420/50	£25		

Laser RAM Upgrades

HP Laser RAM		GQ5000 512k	£95
IIP & III 1MB	£95	KX-P4420 1M	£249
IIP & III 2MB	£125	KX-P4450i 1M	£299
II & IID 1MB	£102	KX-P4450i 2M	£575
II & IID 2MB	£127	Star LP-8 1MB	£143
II & IID 4MB	£315	Star LP-8 2MB	£285
		Star LP-8 4MB	£429

Laser Drum & Developer

Epson Drum	GQ5000 £129	EPL7100	£129
Panasonic 4420 Drum	£69	Developer	£59
Panasonic 4450 Drum	£99	Developer	£80
Qume Drum	£76	Developer	£56

Jetpage Postscript Cartridge

for Laserjet II **£369** IID & III **£375**

NEW – HP Laserjet

Various Font Cartridges	£45
Superset Font	£195

Integrex Colour Jet

- Colour Jet 132 Printer **£515**
- Paper Roll **£6.50**
- BBC Screen Dump Software **£10**
- Colour Cartridge **£19.50**
- Black Cartridge **£11.25**
- Black Textile Cartridge **£17**
- 100 A4 OHP transparencies **£55**
- 8K Serial Interface Optional **£123**

Special Offers this month

Canon BJ 10E Printer	£219
HP Deskjet 500 Printer	£349
Panasonic KX-P1123 Printer	£162
Panasonic KX-P1124 Printer	£180
Panasonic KX-P1592	£199
TAXAN 795 Trinitron	£435

Epson Printers

DFX5000	£1105	LQ860 Colour	£489
DFX8000	£2070	LQ1050+	£520
EX1000	£535	LQ1060	£606
FX850	£294	LQ2550+	£729
FX1050	£368	LX400	£116
FX1060	£599	LX850	£179
LQ400	£178	SQ850	£459
LQ550	£246	SQ2550	£719
LQ850+	£425		

Cut Sheet Feeders for

LX400/800/850/LQ400/500/550 **£69**
EX800/FX800/850/LQ800/850 **£130**
FX/LQ 1000/1050/SQ850 **£159**
LQ 2550 **£390** SQ2550 **£176**

Tractor Feed for

LQ800 **£44;** LQ850/FX850 **£69;** LQ1050/FX1050 **£85;** LQ2500 **£90;** LQ2550 **£90.**

Accessories

- EX800/1000 Colour Option **£45**
- EX800/1000 Colour Ribbon **£14**
- LQ2500 Colour Option **£65**
- Multifont Card for LQ550/850/1050 **£95**

Epson Printer Interfaces

All these interfaces fit inside the printer

RS232	£32	RS232 + 2K Buffer	£52
IEEE 488	£95	RS232 + 8K Buffer	£75

Printer Leads

BBC Centronics 4' long	£5
BBC Centronics 6' extra long	£7
Compact's Special Centronics Lead	£7
Archimedes Printer Lead 6'	£6
Nimbus Centronics Lead	£6
IBM/Archimedes Parallel Lead 6'	£6
IBM/Archimedes Parallel Lead 5 metres	£13
IBM/Archimedes Parallel Lead 10 metres	£19
Double Ended 36 way Centronics Lead 4'	£7
Double Ended 36 way Centronics Lead 6'	£9
MSX Centronics Parallel Lead 4'	£12
RS232 Leads (Various)	P.O.A.
IBM Keyboard extension lead coiled	£5

Roland Plotters

(Official Roland Appointed Distributor)

- **DPX 2500** £2389
- **DXY 1100** £528
- **DXY 1200** £699
- **DXY 1300** £889

New Launch

Roland SketchMate

The Intelligent Graphic Plotter

The SketchMate offers the same high performance and versatile function of larger, more expensive plotting systems, but at an affordable price. It is very compact and lightweight. In restricted space, it can be operated in a tilted position. Is compatible with virtually all CAD software as well as a wide range of business softwares. The 'ArtMate' software package supplied, is designed to be used with IBM PC/AT systems.

Specifications: Plotting area: 297 x 216mm. Number of Pens – 8. Magnetic Paper holder. 5K Buffer. Parallel and RS 232 Serial interfaces. Accessories: 8 pens, AC Adaptor, 4 x Magnetic paper holders, User manual, marking sticker, Rubber sticker, 10 x A4 test paper, 2 x A4 OHP transparency film. Dimensions: 360(W) x 410(D) x 105(H)mm. Weight 2.6 Kgs.

Launch Offer: £380

CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383

Listing Paper (Perforated)

- 1,000 Sheets 9.5" x 11" Fanfold Paper **£7**
- 2,000 Sheets 9.5" x 11" Fanfold Paper **£11**
- 1,000 Sheets 9.5" x 11" NCR 2 Part Fanfold **£21**
- 1,000 Sheets 15" x 11" Fanfold Paper **£9**
- 1,000 Sheets true A4 Fanfold Paper 70gms **£11**
- 2,000 Sheets true A4 Fanfold Paper 70gms **£21**
- Teleprinter Roll (Econo paper) **£4**

(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).

Carriage 1K Sheets £2.50, 2K Sheets £3.00

Printer Labels

(On continuous fanfold backing sheet)

1,000 90 x 36mm (Single Row)	£6.00
1,000 90 x 36mm (Twin Row)	£6.25
1,000 90 x 49mm (Twin Row)	£7.50
1,000 102 x 36mm (Twin Row)	£6.75

Special Offer

Hitachi/Acorn 12" High Resolution, ergonomically designed Colour Monitors. Supplied complete with a swivel base and a BBC lead.

Only: £139 (While stocks last)

Printer Ribbons & Various Dust Covers

Type	Ribbons	Dust Covers
Brother HR15/20	£6.00	–
BBC Micro	–	£3.50
BBC Master	–	£4.00
Archimedes Micro pair	–	£9.00
Citizen 120D	£2.75	£4.50
DMP2000	£2.75	£4.75
EX800/1000	£3.50	£5.00
RX/FX80/85/800/MX80	£2.95	–
FX/MX/RX100/1000	£3.95	–
Kaga/Taxan KP810/815	£3.25	£5.00
LQ400/500/550/800/850	£3.25	£6.00
LQ1050/LQ2500	£4.00	–
LX80/86/800/850	£2.75	£4.50
LX400	£3.50	£5.00
M1009/GLP	£2.95	£3.75
NEC P2200	£4.50	£5.00
Panasonic KX1080/81	£3.25	£4.75
Panasonic KX-P1124	£7.50	£5.00
SQ2500	£23.00	£5.50
Star LC10/NL10	£2.75	£5.00
Star LC24-10	£2.95	£6.00
Olivetti Ink Jet Cartridges (set of 4)	£9	

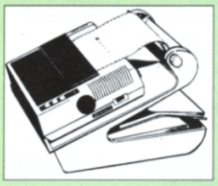
Our attractive Dust Covers are manufactured from translucent PCV. The seams are stitched and edges are taped to prevent splitting due to continuous use.

Original Panasonic Ribbons

Guaranteed to last 3 million characters

P110 for KX-P1081, 1592 & 1595	£7
P115 for KX-P1180/P1624	£7
P145 for KX-P1124	£8
P140 for KX-P1540	£10
Colour Ribbons for KX-P1081, 1592 & 1595 Brown, Blue or Red	£9.95 each

Professional Printer Stand



The professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Its ergon-omic design ensures smooth paper flow and automatic refolding.

80 Column version £24 (carr. £3)
132 Column version £29(carr. £4)

Universal Printer Sharers/Changer

Connect up to 5 Micros to 1 printer or 5 Printers to 1 Micro with our combined, Sharer/Changer. These Units are made to a very high standard. For extreme reliability, they all have Printed Circuit Boards mounted inside the case, (not a Spaghetti Junction of wires). Internal connection is made via high quality ribbon cables.

(Ideal for School environments)

Connects	Serial	Centronics
2 to 1	£16	£17
3 to 1	£22	£24
5 to 1	£36	£32

(Cables extra at £6 each. Please specify type required when ordering)

2 Way Compact Printer Switch

A handy 2 way printer switch. Enables one micro to be connected to 2 printers or vice versa.

Centronics **£18;** Serial **£17**

(Cables extra at £6 each)

Auto Printer Sharer Switch

Connects	Serial	Centronics
2 to 1	£36	£39
4 to 1	£59	£55
8 to 1	–	£85

256k Multi Spooler

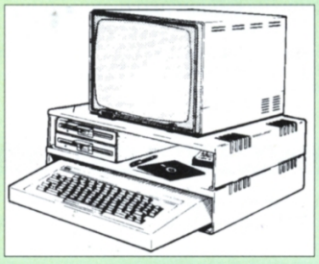
These Auto Centronics Printer Sharers have built-in 256K of Printer Buffers. They can be used as Auto Sharers, Printer Buffers or both.

- 2 In/2 out **£135**
- 4 In/2 out **£169**
- 8 In/1 out **£199**

Compact Converter Units

Serial to Parallel **£36** Parallel to Serial **£37**

Plinths for the BBC B & Master 128K Micros

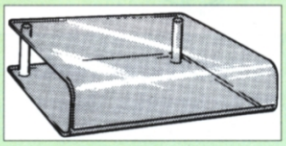


Protect your computer from the heat of your VDU. Our micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and VDU, whilst the double height version provides enough room for our stacked disc drive and other peripherals like, Eprom programmer, music unit or simply discs & stationary. The computer slides neatly in the lower section allowing easy access to remove the lid. Colour: Matching BBC Beige.

Single BBC Plinth	420 x 310 x 105mm **£13**
Double BBC Plinth	420 x 310 x 210mm **£24**
Single Master Plinth	490 x 310 x 105mm **£14**
Double Master Plinth	490 x 310 x 210mm **£26**

(Carr. Single plinth £2; double plinth £3)

Perspex Printer Stand



Give your Computer System a touch of Class with our elegant, smoke finished Perspex Printer stand.

80 Column version **£16** (carr £3)
136 Column version **£20** (carr £4)

Continued→ → → → → → → → →

QUEST MOUSE Mk II

- Quest Mouse II & Quest Paint £58
- Quest Mouse II, Quest Paint, AMX Stop Press & Pagefont £89
- Quest Mouse II only £29
- Quest Paint Software only £34
- Quest Font Disc (22 Text Fonts) £15
- Quest Mouse Mat (Red or Blue or Green please specify) £3
- Quest Colour Dump Disc – This new software allows you to print direct from Quest Paint to your Integrex Colour Printer £18

(P.S. Quest Paint is not compatible with BBC Compact)

Quest Paint is the winner of the BBC Acorn User 1990 Award for the Best Art/Graphics software

ConQuest

Quest combined with ConQuest and Acornsoft GXR ROM make up THE MOST POWERFUL drawing packages available for the BBC range. Quest Paint is able to take advantage of almost any additions to your machine, such as Shadow or Sideways RAM. ConQuest takes this principal even further, by utilising the otherwise normally incompatible Sideways RAM facility by holding pictures in them.

ConQuest ROM Package £30
(Price includes software in ROM and a comprehensive Manual).
(Not Compatible with BBC Compact)

ARCHI Mk II MOUSE

An extremely reliable replacement mouse for Archimedes Micro £32

QUEST – Tracer ball

An attractively finished, extremely reliable, mouse replacement, input device. Requires very little desk space. Connects directly to your BBC B, BBC Master or Archimedes Micro.

QT-10 BBC/Master Version **£27**
QT-20 Archimedes Version **£30**

RB2 Marconi TRACKER BALL

RB2 (AMX/Quest compatible)	£45
RB2 including Quest Paint	£75
RB2-A for Archimedes	£46

THE NEW Mk III AMX MOUSE

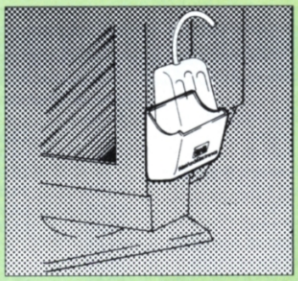
Inc. Super Art package

ONLY: £59 (carr £3)

(Please specify for BBC, Master or Compact)

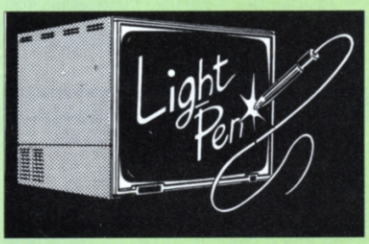
MOUSE MAT	£3
AMX MOUSE ONLY	£29
AMX SUPERART Package	£34
AMX STOP PRESS – A Desktop publishing software. Works with Keyboard, Joystick or a mouse	£32
PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker	£13
AMX DESIGN (ROM)	£55
AMX XAM Educational	£15
AMX EXTRA EXTRA	£16
AMX MAX A gem of desktop (ROM)	£20

WE Mouse House



Treat your mouse to a cosy Mouse House. This handy little gadget solves the problem of where to store your mouse when it is having a rest. Made of sturdy plastic, the WE Mouse House attaches to the side of your computer, monitor, disc drive or desk.
It protects it from damage when not in use, yet within easy reach when you need it again. There is also a second compartment for your pens and pencils – and at £4 it doesn't cost a rodent's ransom.

Price £4



Our Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted. (Price includes FREE software Disc and Operating Manual)

Only £21

FLEET STREET EDITOR

Software pack for BBC Micro	£33
Software pack for the Master	£39
Admin Xtra Disc Utility	£13
Fonts N Graphics Disc Utility	£13

BEEB VIDEO DIGITISER

"Test Bureau Approved for Use in Education"

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro. This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket. The software supplied includes a sophisticated, fast screen dump routine.
Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem. The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

£109 (Carr. £5)

(BBC B+ and Master compatible, except Master with Econet)

(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)

The Beeb HandScan

Hand-held Scanner for the BBC Micro

Watford Electronics are pleased to announce the launch of the first hand held scanner for the BBC Micro. HandScan is a compact unit which will allow photographs, diagrams, or any other documents to be digitised quickly and easily, to then be used in a desk top publishing package, art program, or even in your own Basic programs! These useful devices have been available for faster and more expensive micros for some time, but only now is Watford Electronics able to offer the BBC Micro computer.

The HandScan plugs directly into the 1MHz bus on the BBC while a comprehensive set of utilities provided by the sophisticated ROM firmware. The scanner has a resolution of either 100 DPI or 200 DPI when accuracy is essential. Pictures as wide as 4" may be scanned in mode 0 and various types of dithering may be selected to simulate the grey levels of a scanned picture.

All necessary software has been included in the firmware to allow the scanner to read images directly into our Wapping Editor with little more than the click of the mouse. The digitised picture may then be incorporated into your magazine, newsletter, report or any other document.

Beeb HandScan & Firmware **£135**

Winner of the BBC Acorn User 1990 Award for the Best DTP/Word Processor

The Wapping Editor

The Wapping Editor from Watford Electronics represents a breakthrough in Desktop Publishing for the Beeb. The package includes a 64K ROM containing ALL the software needed to get into print fast; a very sophisticated graphics module, professional quality typesetting software, a word processor, a comprehensive font editor for designing your own typefaces, and a variety of printer dumps. This mouse-driven system is designed for the BBC B, the B+ and Master computers and will take full advantage of any Sideways and Shadow RAM that may be fitted. It will run under DFS, ADFS and Network filing systems and requires as a minimum just a single 40 track drive.

Included with the system is a utility disc containing several high quality fonts, various utilities and a ROM image of a Support ROM. A comprehensive 100 page manual completes the package. The Support ROM contains routines to allow an area to be rotated to any angle or distorted to any four-sided shape. Also included are facilities to draw ellipses at any angle and sectors, segments and arcs (in Master or BBC B with Acorn GXR). Another of the features of the Support ROM is a 'Turbo DFS' which gives DFS access times comparable with those of ADFS.

Page Layout Section

The Wapping Editor may be used to create pages of any size from an A6 to a full A3 page. If none of the eight default page types suit your purpose, the stand-alone page creation program may be used to create pages to your own requirements. By using proportionally spaced fonts and genuine microspacing it is possible to print over 150 characters across an A4 page. A unique feature of the Wapping Editor is the 'A5 x 2' page size allowing two A5 pages to be printed side by side onto a single A4 sheet.

The graphics module incorporates the facilities like: pencil, brush, airbrush, polygon, circle, eclipse, fill, cut & paste, etc.

Text may be typeset, either justified or unjustified, in any font anywhere on the page. Simply select which font and text document you wish to use, and pull out a rectangle on the page where you want the text to be – it's as simple as that! Multiple columns may be printed just as easily and a special 'expand' feature may be used to expand the microspacing so that the document exactly fits the space defined.

Word-Processor

The integral word processor is the ideal tool for producing your text documents, although text can of course be read in from any of the other popular word processors such as View, Wordwise etc.

The Font Editor

The font editor module will allow you to design your own typefaces or to modify the ones provided on the utility disc. This sophisticated editor has numerous functions designed to take the tedium and frustration out of producing good looking, well balanced fonts. Each character may be individually proportionally spaced and characters of any size up to 16 x 16 pixels may be defined.
Pictures may also be 'grabbed' from a video source by using the Watford BEEB Video Digitiser.

Wapping Editor Software Pack £69
Wapping Editor plus Mouse £89

(Wapping Editor only works with Master Compact if a Mertec Expansion box is fitted)

NEW

At the request of many of our customers we are now able to offer training in the use of Wapping Editor DTP package. For further information please telephone 0923 37774 and ask for Tim or Shiraz

Wapping Art Disc

Over 250K of clip art to cut and paste into your Wapping Editor pages. Pictures include maps, transport, people, media, sport, games etc.
Two 'ratio' screens for use with hi-res and rotated A5 pages to ensure images are not distorted when printed out.

Music writing symbols in the form of pattern and brush for quick production of manuscripts are included together with staves.

There are two prepared hi-res pages layed out for printing labels, both single and double width. Ready made label designs are included but these can be easily replaced with your own designs.

A Mode 0 screen dump routine is also included. To pack such a large amount of data onto the discs the screens have been compressed and routines to compress and expand Mode 0 screens are included on both discs. Using the packing routine you can archive large numbers of screens onto a single disc.

£15

Wapping Font Disc 1

Sixteen additional fonts, including smaller version of Oberon and Daisy and two new sizes of the standard font for the Wapping editor.
Also included are three Mode 0 screens containing giant 'headline' fonts to cut and paste to create extra smooth headlines.
Supplied complete with instructions.

£12

Wapping Font Disc 2

This new addition to our Wapping range of DTP software provides you with additional 23 fonts for the Wapping Editor DTP pack. (80 track discs only).

£13

Laser Direct

By using the power of the Archimedes RISC processor, it offers the best of both worlds – print speed up to 5 times faster than typical Laserjet compatibles – uses outline fonts so that any font can be scaled to any size – works with all programs that use RISC OS printer drivers. Ideal for use with Genesis, !Draw, Acorn DTP, Impression, etc. Includes 50 sheet paper tray and a single sheet/envelope tray. Requires one expansion slot and at least a 2Mbyte Archimedes. A very compact printer, a very low initial cost and very low running costs.

Special Price: £849

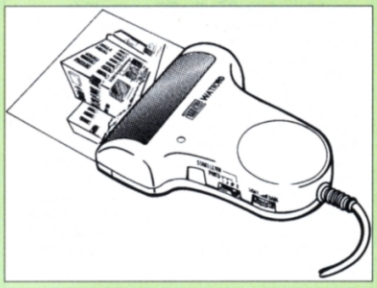
- Special High Res Laser Direct Card 600 DPI for Canon LPB4 Laser Printer **£325**
- LPB4 Printer plus High Res Card **£1025**

(For demonstration, call in at our retail shop)

CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383

All prices are exclusive of VAT

Archi Mk II Hand Scanner



Watford Electronics is now able to offer a complete hand held scanning package, possibly the most essential addition to any desk top publishing system, for only £149. The package includes the most comprehensive utility software available for the Archimedes, a high quality hand held scanner, and all necessary documentation to get you going straight away.

SCANNER

The scanner is capable of scanning up to an amazing 400 dots per inch (DPI)! The scanning area is 4" wide, and the height is only limited by the maximum amount of memory available. The dot resolution may be switched to 100, 200, 300 or the maximum 400 dpi. One of four operating modes may be selected offering either pure monochrome scanning, or one of three grey level modes. The grey level modes use different size dither patterns to represent up to 16 shades of grey. There is also a dial to allow the "brightness" to be adjusted over a wide range, in order to optimise the quality for any specific image. The scanner interface is a standard, single width, expansion card (podule) which plugs into the Archimedes' backplane. The socket on the rear panel connects the scanner by 1.8 metres of cable.

SCANNER SOFTWARE

Full use is made of the windowing and the multi-tasking facilities of RiscOS. The software is supplied in a 64Kbyte ROM located on the interface board. The scanner appears as a small icon on the desktop icon bar, and the software is retrieved from the ROM simply by clicking on that icon. As you scan a page, the image appears in the scanning window on the screen, scrolling up in real time. The other facilities included in the software are.

Cropping and scaling to any size including stretching and squashing in X and Y direction separately.

Colour tinting.
X and Y flip.

Edge detection which turns solid objects into outlines.

Selective directional copying which allows features (i.e. lines or text) to be made thicker or thinner.

Scanned images may be saved as sprite files or transferred directly into other RiscOS applications (DTP, Draw, Paint) simply by dragging the sprite file into the application's window. Sprites may also be generated using anti-aliasing. This greatly improves picture quality and is particularly effective when scanning material with a range of grey tones, such as photographs. Images can be printed on any printer that is supported by a RiscOS printer driver, with optional settings for portrait or landscape modes, image scale and positioning. Images are printed using the full resolution of the printer and are not limited to the screen resolution.

On-screen help is provided via the RiscOS interactive help facility. Calls are also provided in the ROM for users wishing to write their own software, incorporating the use of the scanner.

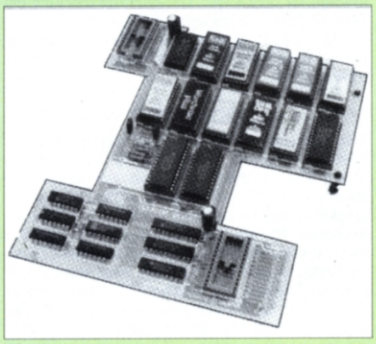
AHS-4 Archi 300/400 Version £149
AHS-3 Archi A3000 Version £175

Continued→ → → → → → → → →

STAFF VACANCIES

Watford Electronics is the leading supplier in the Acorn computer field and has established itself in the PC compatible market with its Aries PC computers. In its eighteen year history, Watford has always kept itself at the forefront of the new technology. Due to our latest expansion, we require staff to man our BBC/Archimedes and PC Technical Departments. Applicants will be required to be familiar with BBC/Archimedes hardware and software, and PC staff will need to be familiar with PC computer hardware. Good rates of pay, excellent prospects. Subsidised company accomodation is available to single persons if required. Telephone Keith Archer or Shiraz Jessa for interview, or write to us enclosing your CV.

Solderless Sideways ROM Socket Board



The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:

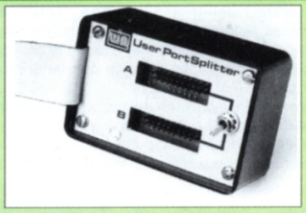
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £35
Battery Backup fitted **£39**
Battery Backup only **£3**
16K Sideways RAM **£8.50**
(carriage £3)

- Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

Only: £8

User Port Splitter Unit



Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaneously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination

Excellent Value at **£22** (carr £2)

Sideways ROM ZIF Socket System

Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.
- The low profile of the socket allows unrestricted access to the Keyboard.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for professionals and Hobbyists alike.)
- BBC, B and B+ compatible.

ONLY **£18** (carr £3)

BBC B Low Profile Cartridge System

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack for the BBC B.

- Complete System **£11**
- Spare Cartridges **£2.75**
- Spare Rack **£1.65**

ROM Cartridges for the BBC Master

Will accept the new larger PIggy Back ROMs like: Interword, Interbase, Quest, Conquest, etc

Twin **£9**; Quad **£14**

16K Disc Ram Module

(16K Sideways RAM Module)

Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

- Write protection (useful in a variety of circumstances)
- Compact construction
- No overheating or overloading problems.
- Free utilities disc supplied
- Can be used as a 16K PRINTER BUFFER.
- Ideal for profressional software development.
- Supplied with utilities software disc.

Only: **£29** (carr £2)

Optional Battery back-up fitted **£3**

ARIES CORNER

B-32 Shadow RAM Card

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Cobal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus, Interword and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved ★FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as th printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the 6502 processor socket on you BBC micro – no flying leads to connect and no soldering. Provision of the onboard ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

- Recommended by Computer Concepts for use with their Inter series of ROMs.

Price: **£69** (carr. £3)

Aries B-12 Sideways ROM Board

The B-12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

If you do not have a B32 or B20, a small adaptor module (the Aries-B12C) is available at a nominal cost

Price:	Aries B-12	**£36**
	Aries B-12C	**£5**

Aries B-488 IEEE-488 Interface Unit

The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB or 'HP IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

£238 (Carr £3)

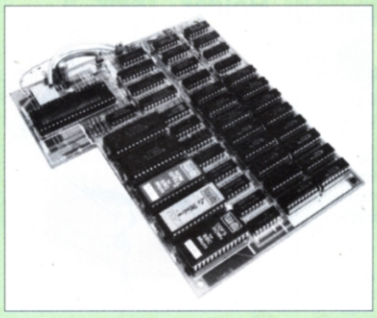
Voltmace Joysticks

Delta 3B Single Joystick	**£10**
Delta 3B Twin Joysticks	**£15**
Delta 3C Joystick for Compact	**£10**
Delta 14B Single Joystick	**£11**
Delta 14B/1 Adaptor Module	**£12**
Transfer Software Disc-Tape	**£7**
Delta-Cat A mouse eliminator Joystick for the Archimedes	**£24**

Delta Base B

Analogue aircraft style yoke Joystick to run in the analogue port of the BBC B & Master 128 **£25**

ROM/RAM Card



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 7 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Compatible with BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROMSPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

PRICES:

- ROM/RAM card with 32k dynamic RAM **£48**
- ROM/RAM card with 64k dynamic RAM **£65**
- ROM/RAM card with a massive 128k dynamic RAM **£109**

(carriage on ROM-RAM Card £3)

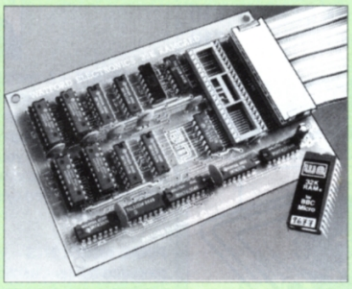
OPTIONAL EXTRAS:

- 16k plug-in Static RAM kit **£9**
- 16k Dynamic RAM for Upgrade **£13**
- Battery backup **£3**
- Read and Write protect switches **£2 each**

Complete ROM-RAM board
All options installed **£115**

P.S.
IS your existing ROM Board overflowing with ROMs? Do you need more Sideways RAM? Is your Board unreliable? Then upgrade to Watford, ROM/RAM Board and pay £5 less.

32K Shadow RAM/Printer Buffer Card Expansion Board



A MUST FOR WORD PROCESSING

Don't throw away your BBC B for a BBC B Plus or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16k or even 20k, but a massive 32k of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.
- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.
- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24k of text in memory. This product is recommended as an ideal complement by Computer Concepts.
- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20k of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28k of program space.
- Use the FULL 32k or the bottom 12k of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS432 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138, 145,ADVAL etc). Please note only a 12k printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.
- Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

Only £59 (carr £3)

(Price includes a comprehensive manual and the ROM)

BBC SOFTWARE'S Popular Educational Software

- Maths with a Story 1 (Disc). 4 primary level maths programs **£20.00**
- Maths with a Story 2 (Disc). 4 further maths programs. **£20.00**
- Picture Craft (Disc) 6-14 age group. Pack consists of flexible geometrical design & colouring programs. **£17.00**
- ECOLOGY O-Level program. **£20.00**
- POLYMERS O-Level program. **£20.00**
- Classification & Periodic Table O-Level. The suite is supplied with its own database of chemical elements which can be classified according to your own rule. **£20.00**
- ADVANCED TELETEXT SYSTEM **£8.65**
- PERIOD TABLE SOFTWARE **£20.00**
- Computers at Work – Primary **£17.35**
- Introducing Geography 11-17 years **£17.50**
- Electric Fields 6-14 years **£11.25**
- Espana Viva – 3 Discs **£19.95**
- WHITE KNIGHT Chess game **£16.00**
- A Vous La France **£29.00**

More Educational Software

- **FUN SCHOOL 2 – Red:** Under 6 yrs – 8 programs on Discs, Shape Snap, Find the Mole, Teddy Count, Write a Letter, Colour Train, Pick a Letter, Spell a Word & Teddy Bears Picnic. **£12.00**
- **FUN SCHOOL 2 – Green:** 6-8 yrs – Eight programs on Disc, Number Train, Shopping, Maths Maze, Treasure Hunt, Bounce, Packing Caterpillar, 3 Number jump **£12.25**
- **FUN SCHOOL 2 – Blue:** Over 8 yrs – Eight programs on Disc, Build a Bridge, Passage of Guardians, Unicorn, Logic Doors, Souvenirs, Code Boxes, Mystery Machine & Escape. **£12.50**
- **FUN SCHOOL 3 – Red** **£19.95**
- **FUN SCHOOL 3 – Green** **£19.95**
- **FUN SCHOOL 3 – Blue** **£19.95**
- Six French Games – Aimed at pupils in their first year of French, but also useful as revision for more advanced students 11 years+ **£26**
- More French Games – Another 6 games 12 years+ **£26**
- Au Restaurant and Accident de Route 12 years+ **£26**
- Boulogne and Oh-Les – 2 programs for beginners **£26**
- Letters to French Penpals – 11 years+ **£26**
- French Programs with Henri Beret – The programs in this series present vocabulary, grammar and role-play phrases in the form of animated games. 11-16 **£22**
- Six German Games – Aimed at pupils in their first year, but useful as revision for more advanced student of German. 12 years+ **£22**
- More German Games – Aimed at pupils in their 2nd year of learning German. 12 years+ **£22**
- The Cloze Program – Using context clues to predict is much more than a gap filling exercise. All ages **£26**
- An Introduction to Electronics – Brings together all the basic electronics required for a GCSE Physics or CDT course. 14-16 years **£26**
- Computer Control – This is a package of 3 programs simulating control of a greenhouse, a robotic arm & a chemical plant. 14-16 years **£26**
- The Nuclear Reactor – An interactive, menu driven program for GCSE pupils. Demonstrates & explains nuclear fission & the chain reaction. 14-16 years **£22**
- PUNCMAN Learning punctuation
  Puncman 1 & 2 for 7 – 13 years **£15**
  Puncman 3 & 4 for 8 – 14 years **£15**
  Puncman 5 & 6 for 8 – 15 years **£15**
- Yes Chancellor – A chance to take over number 11 at Downing Street. 12 years+ **£18**
- Letters & Pictures – Introduces phonic skills to Infants 6-8 years **£15**
- Numbers & Pictures – Early number learning is a great fun (4-6 years) **£15**
- Note Invaders – Budding musicians can learn the notes on the Clef with this elegant game 3 programs (7 to Adults) **£15**
- Maps & landscapes No. 1 (9-14 years) **£18**
- Help Your Child learn Basic Map work No. 2 (9-14 years) **£18**
- Pirate – Educational Adventure (8-14 years) **£15**
- Spelling Week by Week (6-14 years) **£18**

Archimedes Software

- Bookbinder **£43**
- BUMPER DISC **£14**
- Bumper Disc 2 **£14**
- Craftshop 1 **£26**
- Craftshop 2 **£26**
- Desktop Stories **£27**
- DigiSim **£35**
- Droom **£17**
- Jiglet **£27**
- Jigsaw **£28**
- Numerator **£60**
- Snippet **£26**
- Fun School 2A Red (up to 6 years) **£12**
- Fun School 2A Green (6-8 years) **£14**
- Fun School 2A Blue (8 years +) **£14**
- Gate Array Teaching System **£68**

Continued→ → → → → → → → →

Computer Concept's ROMS

Communicator	£49
Disc Doctor	£28
Inter BASE	£49
Inter CHART	£25
Inter SHEET	£37
Inter WORD	£36
Mega-3 ROM	£76
Spell Master	£42
TERMI	£25
Wordwise	£24

Wordwise plus

£40

We are giving away absolutely **FREE,** the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear test-segment area.
- BBC B, B+ and Master compatible.

Only **£24**

(N.B. Word Aid requires a Disc interface in your Micro)

Acorn ROMS

View 3.0 ROM	£45
View Professional	£50
Viewsheet (Acornsoft)	£36
Viewstore	£36
Viewspell with 80 track disc	£25
Viewplot Disc	£20

(Please specify for Master 128 or Compact)

View-Index	£12
Overview packs 1 & 2	£65
Hi-View	£38

MINI OFFICE II

DISC Version for BBC B & B+	£14.00
DISC Version for BBC Master	£16.00
DISC Version for the Compact	£18.00

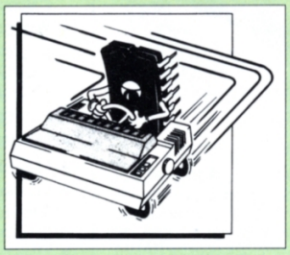
(When ordering please specify for which Micro & 40 or 80 track Disc)

All prices are exclusive of VAT

View Printer Driver Discs

Epson FX & RX 80	£10
Juki & Brother HR	£10

View Printer Driver ROM



View is a powerful word processor, but it seriously lacks in terms of printer driver support. With the View Printer Driver ROM, the View users will find themselves in the realms of advanced word processing.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, Panasonic KX-P1081/2, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built-in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redifinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute ★ command when printing.

Other features include a very powerful on-screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory-based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips.

Price: Only £33

OFFICE MASTER

CASHBOOK – A complete "Stand Alone" accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cashbook system and will provide you with a computerised system complete to trial balance.

FINAL ACCOUNTS – Will take data prepared by the Cashbook module and produce a complete set of accounts as following: Trial Balance with inbuilt rounding routine; Notes to the accounts; VAT Summary; Profit & Loss A/C; Balance Sheet.

MAILIST – A very versatile program. Enables you to keep records of names and addresses and then print, examine, sort and find them, all with special selection techniques.

EASILEDGER – A management aid software tool designed to run alongside an existing accounting system. Essentially a Debit/Credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information.

INVOICES & STATEMENTS – Greatly reduces the time and cost of preparing Invoices and Statements by storing essential information like customer names, addresses and account numbers. Has VAT routines and footer messages facility.

STOCK CONTROL – Allows you to enter stock received, stock out, summary of stock items and current holdings together with details of total cost, total stock to minimum level, units in stock ordering, quantity and supplier detail.

All this for only **£21** (Disc)

OFFICE MATE

- DATABASE
- BEEBCALC SPREADSHEET
- BEEBPLOT GRAPHICS

DATABASE – Set up a computerised card index system with powerful search facilities.

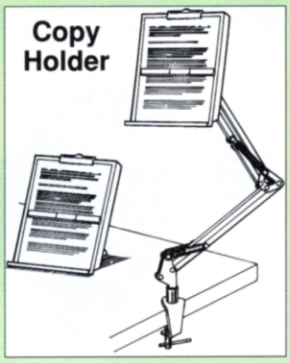
SPREADSHEET – Offers many calculation and editing features

BEEBPLOT – Provides visual representation from Spreadsheet data.

OFFICE MATE
Only £10 (Disc)

CREDIT CARD
24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383

Copy Holder



Whether you want to type in your latest program or the draft of a new trilogy, Watford's manuscript holders are superb for holding your paper at the ideal height and angle to allow you to read and type in ease and comfort.

Available in 2 full A4 versions, desk resting and shelf clamping. Paper is held firmly by means of a plastic retaining ruler and a clip grip. (for resting books or magazines, the desk top version is recommended).

Desk Top **£7** (carr. £3)
Angle poise **£12** (carr. £3)

The Epson RX/FX/KAGA Printer Commands Revealed Handbook

Printer Commands Revealed

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out? Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX-KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, PW1080A or any other Epson FX80 compatible printers like Panasonic KX-P1080/1, etc., with the BBC Micro, both from Basic and Wordwise.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

£5.95 (No VAT)

ALL PRICES EXCLUDE VAT

BOOKS (No VAT on Books)

15 Hr Wordprocessing BBC/View	£6.95
15 Hr Wordprocessing BBC/WW & WW+	£6.95
30 Hour BASIC (BBC Micro)	£12.95
1st Word Plus Rel. 2 Manual	£10.00
A3000 Technical Manual	£29.00
Acorn DTP A Guide to	£17.00
Advanced User Guide for BBC	**£10.95**
Archimedes 1st Step – Beginners Guide	£9.95
Archimedes Assembly Language	£14.95
Archimedes BBC Basic Guide	£20
Archimedes DTP Manual	£10.00
Archimedes Operating System	£14.95
Archimedes Risc-Os Programmers Reference Manual	£79.00
Arm Assembly Lang. Prog. Manual	£15
Assembly Language Quick Ref.	£21.95
BASIC 2 – User Guide	£2
Basic V – A Dabhand Guide	£9.95
BBC Basic Guide (Archimedes)	£19.95
BBC Computer Handbook – The Complete	**£14.95**
BBC Micro – Within the	£11.95
BCPL User Guide	£9
C Big Red Book of	£8.95
C – A Dabhand Guide to	£14.95
C Programming Lang. 2nd Edition	£24.95
COMAL – Introduction to	£9.50
Deutsch Direkt! (Book only)	£5.95
DISC FILING SYSTEM (DFS) Operating Manual for BBC	£6.95
FORTH on the BBC Micro	£9.95
Hackers Handbook – New	£9.95
ISO-PASCAL Reference Manual	£9.95
Mastering Interpreters & Compilers	£14.95
Master 512 Guide – Dabs Press	£9.95
Master Operating System	£12.95
Master Reference Manual Part 1	£14
Master Reference Manual Part 2	£14
Master Reference Manual – Advanced	£17
Mathematical Programs in BBC BASIC	£9.95
MINI OFFICE II – A Dabhand Guide	£9.95
Mouse User Guide to BBC Micro – the Complete	£5.95
Example Programs on Disc for above	£4.95
PASCAL on the BBC Micro	£9.50
PASCAL Programming	£10.95
The Epson FX-KAGA PRINTER Commands REVEALED	**£5.95**
Understanding Interword – A Beginners Guide	£6.50
View 3.0 User Guide	£10
View Guide (View 2.1)	£5.00
View, Viewsheet & Viewstore – Mastering	£12.95
Viewsheet & Viewstore Dabhand Guide	£12.95
VIEW Dabhand Guide	£12.95
Viewsheet User Guide	£10
Viewstore User Guide	£10
Z88 – A Dabhand Guide	£14.95
Z88 Computing	£9.95
Z88 Magic	£14.95
Z88 Using Your	£9.95

BOOKS for IBM PC & Compatibles

1-2-3 Mastering Release 3	£22.95
1-2-3 Mastering – 2nd Ed.	£20.95
1-2-3 Quick Reference	£7.95
1-2-3 Special Edition (QUE) – Using	£22.95
1-2-3 Using – Rel. 3	£22.95
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'ACORN TO PC' enables you to change over painlessly. It shows clearly and quicly how, why and where the two systems (Acorn and MS-DOS) differ. As with a foreign language dictionary, you can use the book to transfer either way – from Acorn to MS-DOS, or from MS-DOS to Acorn.

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'ACORN TO PC' is written clearly and concisely by Dr. John Lockley, who has wide experience of writing and broadcasting. He is currently appearing as a regular contributor on Radio 5, and is co-author of 'The Complete BBC Computer User Handbook'.

Price: £15.95 (No VAT)

The Complete BBC Computer User Handbook

If you own a BBC B, B+, Electron, Master 128 or Master Compact, or Archimedes, then this is the book for you. It shows how to get the best from your machine, and how to make it work for you. The general style and level of presentation means that both the expert and beginner alike will feel comfortable with the quality and quantity of the material.
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It is possible to gain a full understanding of the mouse from this manual. For those not interested in exactly how the mouse functions, complete example programs are also included. These may be typed directly into the micro, without the need for any understanding of the hardware or software involved, enabling the mouse to be used for custom applications.

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(Now reads Archimedes Discs)

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Beeb DOS is a collection of utilities which run on the PC's and enable it to read and write information on BBC discs. You can transfer files between your PC's 360K floppy, high density floppy or hard disc and your BBC discs. In addition Beeb DOS allows you to catalogue, format and compact BBC discs and delete, re-name, lock and unlock BBC files, all on PC's. Each Beeb DOS utility is written in IBM assembler and is run directly from PC or MS-DOS. The Beeb DOS utility can be run from floppy disc, hard disc or RAM drive.

Beeb DOS is supplied on an IBM 5.25", 360K disc complete with a comprehensive operating manual.
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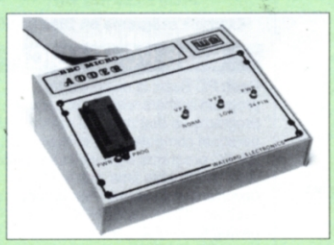

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The Aries PC 386-SX combines many of the powerful features of the 386 system with the frugality of a price tag more at home on a 286 system. With 8/16MHz CPU, this system provides virtually full 386 performance, including the more convenient scheme of memory control that allows easy configuration of expansion RAM as EMS for DOS application.

Features:

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- 8/16 MHz selectable speed
- Legal Bios with built-in Setup routine
- OS/2 and XENIX compatible

Specifications:

- 1MB RAM on-Board expandable to 16Meg
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Aries Notebook PCs are equipped with a full complement of 6 built-in ports; 2 x RS232 Serial; 1 x Printer; 1 x External floppy drive; an external Keyboard and a CGA colour monitor. The obvious benefits include the ability to connect directly to a printer, and to a full size desktop computer to transfer data or text, etc, or to a modem for communications.
Multiwriter 2 Word processor/spell checker, and PC Organiser diary software is supplied with all Notebook PCs to get you started, so now you can take computing power with you where you want to go, in the office, workshop or laboratory, on site, on the train, plane, or at home.

Aries Notebook I, II and III

These Aries Notebook PCs have energy-efficient 80C88 processor chips running at 10 MHz. Model I is supplied complete with a single 3.5" – 1.44MB floppy drive. The Notebook Model II and III are supplied with a 28mS fast access hard disc, 20MB and 60MB respectively.
In his independent review (Computer Shopper – May 1990) the reviewer writes, 'The Aries Portable offers exceptional value for money . . . The computer itself is very much what you'd expect a notebook to be, small, with a cramped but very usable keyboard and a respectable backlit display. It is nice to see that you can actually use the extra 384K as EMS memory – there is even a utility that can turn the EMS into a RAM drive for you.'
In his final verdict he writes, 'Overall, the single most outstanding feature has to be the price tag. A notebook PC with hard disc for under £1,000 has no competition at the moment. If you have a small briefcase, weak arms, or just like the concept of a truly portable computer, then this is your man'.

Aries Notebook NB286-12

The New Aries NB286-12 has a faster, high efficiency 80286 processor running at 12MHz.

'. . . the strongest feature of the Aries is its Hard Disc, with a data transfer rate that would put most desktops to shame . . . the only notebook reviewed that incorporates a 16MHz processor (landmark speed). These two factors combine to make it the strongest performer . . .'

'In terms of value, the Watford comes up on top . . .'

'VERDICT: Excellent specification and performance. This has to be THE choice based on price and ability'.

Computer Shopper Jan. 1991

Specifications

- **Processor:** 80286 running at 10MHz (Notebook I, II & III); 80286 (Notebook NB286-12) running at 12MHz – Zero Wait State – Real Time Clock/Calendar
- **Memory:** 1MB RAM – 640KB + 384KB LIM/EMS
- **Drive:** Internal: 3.5" Floppy Drive (Notebook I) – 2.5 " 20MB Hard Disc (Notebook II & Notebook NB286-12); Notebook III has an internal 2.5" 40MB Hard Drive all 28mS Access speed – Optional external 3.5" or 5.25" floppy drive
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Accessories

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PREVIEW

The new Elite?

Clive Gringras explores the potential of Karma

WHEN compared to the 16-bit games machines the market for recreational programs on the Archimedes is essentially poor.

All we have are the old favourites: Shoot-'em-ups with better graphics and better sound, flight simulators that are smoother with more realistic landscapes and so on. But have the games actually improved?

Anyone who has played on the 32 bit Archimedes or a games machine and the same thing on an 8 bit BBC Micro must admit that the speed, graphics and sound improvements that the Archimedes contributes adds little to the playability of the games – Sim City is a case in point.

It is still the BBC Micro which hosts the best Acorn game of all time: Elite, a multi-layered extravaganza on a 32k machine: If a player was interested in fighting, they need never mine or sun scoop.

Similarly, another player could enjoy it equally as well by trading food across galaxies. Admittedly the graphics and sound weren't great, but extras don't ensure excellence.

But now a game that really stretches the Archimedes is due – *real soon now* – for release. **Karma** is a totally new concept for micros, the first *life-model* available to the general public. At its most basic level, Karma is a 3D space adventure , which is in itself nothing new.

But Karma is far bigger and superbly detailed. Instead of the player being the centre of attention, he or she is only as significant as the other ships.

Your screen shows the view from the vehicle. All graphics are realistic, fully shaded according to the relative position of the sun and animated smoothly. Artificial objects from as small as 1 metre up to 2 kilometres can be seen at distances from as short as 1 centimetre to 450,000,000,000 kilometres on the same scale.

The Karma galaxy is 8,000 light years across and contains some 2,400 solar systems and has the appropriate shape, star type occurrences and star density variations found in reality.

Each solar system contains planets and moons. Each planet, factors allowing – surface temperature, atmosphere, day and night lengths – may be inhabited. Rather than the planet data being invented by the programmers, it is determined by actual astronomical phenomena.

Planetary civilisations also have identities: The variables concerning each civilisation are consistent with their environment. For example, the principle industry of a planet near its sun could be farming. Similarly, older civilisations are likely to be more technologically advanced.

Information relating to drive types, weaponry and the like can be gleaned using the on-board computer, *Tris*. Ships are not only encountered in their own systems, but colonisation and extensive stellar travel are actively occurring throughout the galaxy.

Each civilisation has historic data, to be found or to be told – by other characters in the galaxy – helping the player to understand the importance of various places and understand civilisations' current inter-relations in a wider context.

In Karma the more you know, the better you will be able to plan explorations and understand the cause of certain events.

Even the individuals in other craft can be spoken to via Tris. These people – not neccessarily human – have identities and personalities.

Here's what could happen :

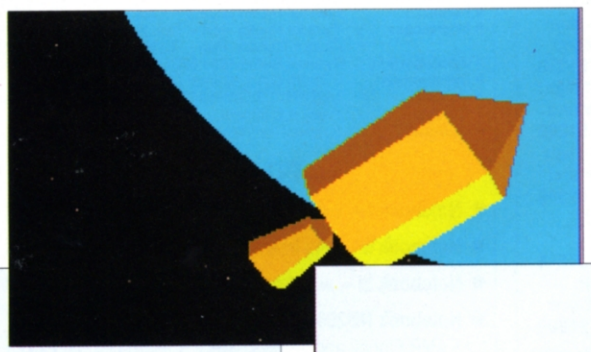
A player arrives at a comet mining community on the outskirts of a solar system dominated by a huge red giant sun. As he draws nearer, by scanning he establishes the presence of a craft leaving the scene.

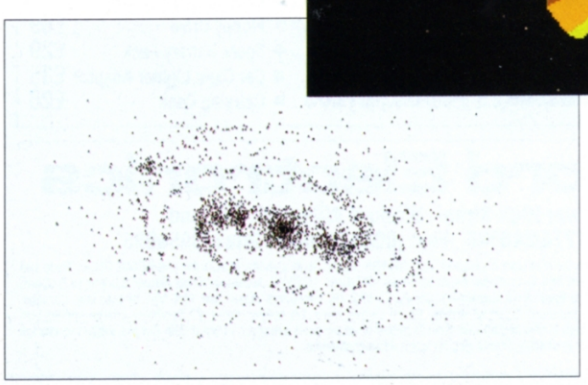
Sensors reveal information of its technology. The craft's civilisation is advanced, as is indicated by its equipment. The player decides an attack would be unwise and attempts instead to communicate with the craft.

Using his communications console and via Tris, he hails the craft and receives a reply. The player asks the craft's identity and discovers from the captain that it's a shuttle, carrying workers to a corporate residential space station, from an ore processing space station.

The player stops the communication and chooses to follow the shuttle. He draws in closer as the workers are being transferred into the residential station. The player decides to scan one of the *beam-boxes* being used to transfer the workers and detects life (the workers) inside.

Later, some workers begin to board a shuttle going to a nightclub





on the other side of the solar system. Following the shuttle, the player arrives at this club. Some 20 seconds after parking in the ship-park the player receives a distress message from a mineralogist who seems to have been attacked by some drunken miners...

Good timing

As you become more experienced, you may be able to predict reactions from particular characters, for example perhaps all people from hot planets with little oxygen are aggressive, whereas characters from colder planets tend to be more placid.

This sort of experience can only be gained by playing the game often. Time within Karma still remains a difficult concept to grasp. The game accesses the CMOS realtime clock inside the Archimedes and updates the game time with actual time. So just before you turn the machine off you may witness the launch of a highly powerful ship travelling towards a moon. When you resume play, say a week later, this ship will be one week nearer the moon than before.

This realtime play could have caused problems: If a player only played Karma after eight in the evening, he might never have seen ships commuting to work.

Thankfully, each civilisation has its own time scale, based on the planet's rotation around its sun. Depending on the equivalent number of Earth days, a player may be able to synchronise the real-time with the game-time he would like to experience. This provides an interesting opportunity to attend night-clubs whenever you arrive on a planet.

Good Karma

As well as swanning around the galaxy, each player has a task in Karma: To relocate a large section of people from their own civilisation. These people are carried as cell tissue cultures contained in small units. A suitable world must be found for as many as possible to continue their lives after the regenerative processes have occurred.

This is difficult to do as there are not many uninhabited, suitable worlds for the purpose. However, when a relationship with a civilisation is going very well they may well house some of the people. Only by interacting with the life of the galaxy can the civilisation hope to be relocated.

Even after a selection has settled on a planet many may die. Unfortunately it is impossible to keep track of and protect all of them.

The game is supplied on eight discs, but will work on a 1Mb machine. Although the programmers are considering releasing an enhanced version for owners of larger machines, the data from the present version installs on to a hard disc drive.

● *Sometimes it takes a while for the full potential of a machine to be exploited, after nine years programmers are still breaking new ground on the 8 bit BBC Micro. Karma is the first program to really stretch the Archimedes. Hopefully it won't be the last.*

CHOCKS AWAY

... on cloud nine

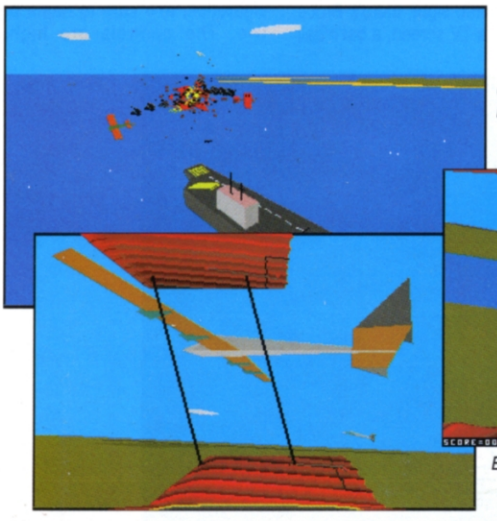
THE main criticism levelled at Chocks Away was the slow frame rate. Brilliant playability, but a problem with the speed. Well 4th Dimension listened to the critics and encouraged the author to speed the whole thing up.

He has succeeded, and Chocks Away version 2 is not only faster but has lots of added features including clouds and a more detailed landscape.

You'll see the improvement as soon as you start playing; the game isn't any harder, just brighter and more exciting.

If you bought the older version just return the pilot's manual to 4th Dimension and they'll send you the uprated software. Definitely recommended.

Steve Turnbull



Got the blighter

Price: £24.95
Supplier: The Fourth Dimension
Dept 4444
1 Percy Street, Sheffield, S3 8AU
Tel: 0742 700661

Even the bridge doesn't slow it down

CRISIS

...beat the braindrain

Price: £17.95
Supplier: CIS, 8 Herbrand Street, London, WC1N 1HZ
Tel: 071-833 4023
Requirements: BBC A3000 or Archimedes

NOW for something completely different: Your brain is under attack and your six (yes, six) senses are on the defensive.

Black tumours and mutated sense cells are roaming your mind and you must zoom around zapping them to restore your sanity – or else be doomed to playing weird computer games for the rest of your life. Well, that's what it says here.

Crisis isn't a game of strategy, it doesn't need much in the way of tactics, just blast the baddies and consume the nice brain cells to keep you going. The graphics are psychedelic, the background uses parallax scrolling and changes as you watch it.

The sound is pretty average with a bit of digitised speech and a very unpleasant scream when you finally eat a flashing tumour – after you've zapped it with your psychic bolt. It's vital to absorb it as quickly as possible because while it's flashing it destroys nearby cell walls very rapidly.

There are six levels: Sight, hearing, smell, touch, taste and ESP, but unlike most games, you can jump between the levels using various teleports, so you don't need to finish one completely before moving to the next.

The main disadvantage with not completing a level is that any remaining tumours continue to generate mutant cells so when you get back the level will be re-populated with unpleasant nasties.

The baddies – mutant cells – are each animated with a few frames and each level has different ones based loosely on the sensory perception you're dealing with.

On the first, sight, there's Bruce Forsyth in a TV screen, a bat'n'ball from the Fireball II arcade game plus some other indeterminate thingies. The ear has to suffer guns going off, and the smell level has cigarettes, and cars to name but two. The controls are highly responsive as you guide your eyeball around your brain although you can only fire if you're moving, and you can't shoot diagonally although that manoeuvre is permitted.

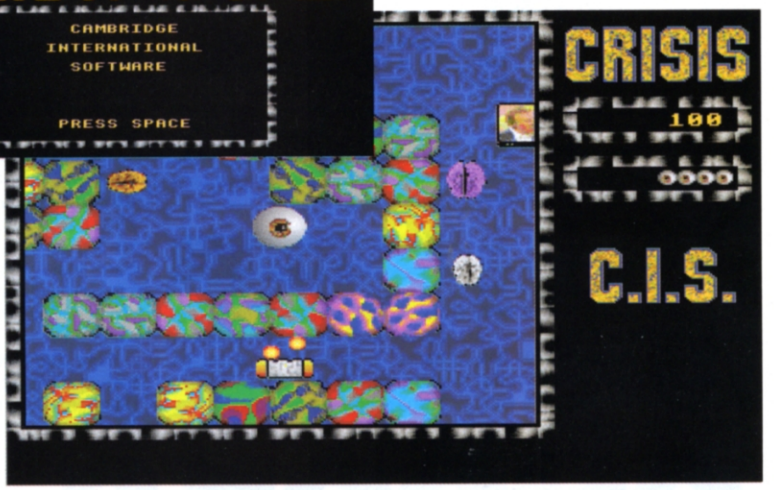
Absorbing the throbbing healthy cells is good for you while running into the mutants isn't, but there's no level indicator showing how well off you are.

In fact while it's really fun to play and very addictive – though a touch wearing on the old eyeballs – it seems to be not quite complete.

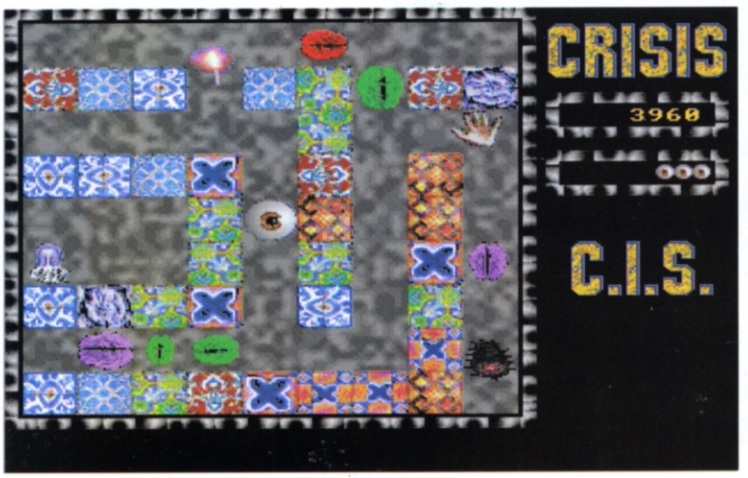
Anyway if you like zapping things and rushing around mazes this is definitely the game for you.

Lazarus

A simple intro



A sight for sore eyes



And now in smelly vision

Sound	6
Graphics	9
Playability	9
Value for money	8
Overall	8

MAHJONG PATIENCE

... And patience is needed

Price: £19.95
Supplier: CIS, 8 Herbrand Street, London, WC1N 1HZ
Tel: 071-833 4023
Requirements: BBC A3000 or Archimedes

PATIENCE games have always been very popular on micros, probably because you don't have to waste time laying out the cards, and the pack never gets dog-eared or sticky.

Well now you can enjoy the pleasures of patience with the colourful variety of Mah Jong pieces on your 32 bit micro. There are 144 blocks with Chinese characters and symbols painted on them representing suits of bamboo and circles, the four winds, the four seasons and four flowers. There are four each of the suits and winds.

A pyramid pattern is built up and the idea is to remove every piece by matching pairs, the problem being that only those tiles at the end of each row can be used.

Although there is a strong element of chance affecting which tiles end up where, skill is required in deciding what order to perform the matches.

The package contains a disc and a single sheet of instructions which are sufficient for the purpose. To start you just double-click the !MahJong icon and hang on for the software to load.

An icon appears on the icon bar with the message *inactive* below it, clicking this brings up a window and starts a new, random, game.

Also on the disc are a 17 presaved start positions to try your hand at. They have very nice *yin and yan* file icons which can be loaded in the usual way either by double-clicking or dragging.

Playing the game is simplicity itself, just click on the first of a matched pair which then inverts and then on the other and they both disappear – the program won't let you make a mistake.

This is the point where the main annoyance appears: It's rather slow, with a good second between the click on the tile and it inverting. As it's written in Basic the programmer could have compiled it for more speed.

When you manage to complete a game there's no big fanfare or message, in fact you can't remove the last two pieces for that extra bit of gratification — instead it just starts up a new random game.

The menu options are quite extensive, allowing starting a new game, re-starting the same game, stepping back up to five moves and showing a move (not necessarily the best).

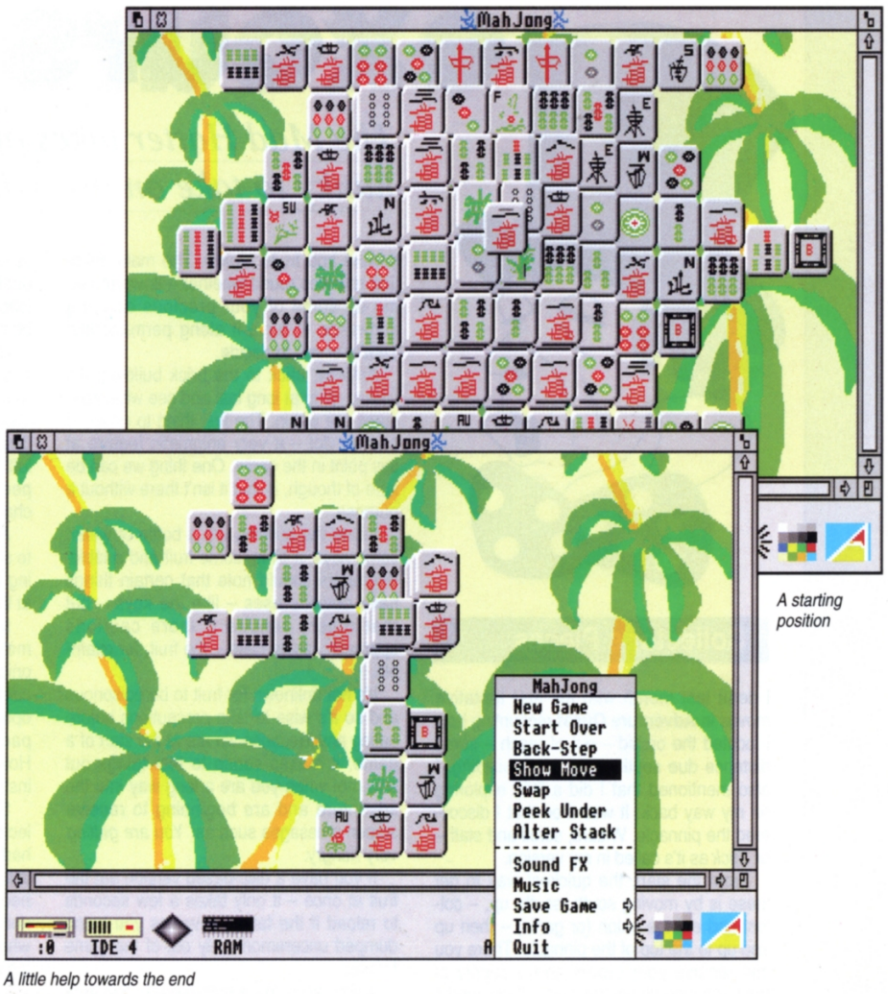
Then there are the cheat options, swapping two tiles, looking under a piece or actually altering a stack. Personally I can do without these, I'd prefer to fail than cheat.

You can save your position at any time, and have sound effects or music playing. The sound effects include little phrases like "So you're going to cheat" while the music is a vaguely oriental and not too obtrusive sound tracker piece.

This is a nice little program, and I think I'll just have another quick game.

Steve Turnbull

Sound	*7*
Graphics	*8*
Playability	*8*
Value for money	*7*
Overall	*7*



A starting position

A little help towards the end

Excruciating excursions

The Mad Hatter takes off his knotted hanky to take on the bull

TERRORMOLINOS has nearly offered its all to those of you who have been following the progress of this adventure. Now only the excursions are left, plus a few comments about the various hotels.

Your hotel, the Excrucio, has a restaurant which should be avoided until the very end. Other hotels are: The Excelsior (it has a Banner with a Strange Device) where you can rejoice at regular rejection, and the Excalibur (the management is noted for sharp practice). Enter this hotel by all means, but save your position first.

Each excursion starts from the same point, Southwest of the Plaza, and is triggered by entering Go (Excursion). So – to get it over with – let's Go Bullfight.

Provided you've still got your red hanky and it is now unknotted, all will be well, Beryl will ask if she can take a photo (No. 8) and – provided the flash cube has been removed – you can answer *Si*. Little Ken will now run out into the arena and be chased by the bull.

My own feeling is that we should let the min1ature monster suffer, but there's no way of finishing the game if we do, so wave hanky instead. After that it's a question of taking the bull to a china shop – where else? – and returning to the coach.

Next Go Wine-taste: Simply follow the sights around until you come to the dusty cellar and Beryl is terrorised by a spider. Take (flash) photo (No. 9), kill spider, go back to the coach and board coach.

Go Monastery and ascend to the top of the belltower to take photo (No. 10) without flash. After that come down and go East to the cloisters. You'll discover that Mr. Snargsby has got himself lost in the catacombs and that you can't get back without him.

To find him you must go down, southwest, north, east, northwest and down. Somewhere along this route you will encounter him. Once you have found Mr. Snargsby call him and retrace your steps to the coach and board it.

Last of all go to your hotel restaurant and examine the menu, order a meal. Eat the sludge and take the pills to increase your score.

Once you have done all these things the coach will arrive to take you home, and it's just a question of following the instructions while you plan your next little caper.

Next month I am going to begin a treatment of a Melbourne House adventure which will kindle memories of yesteryear, *Dennis Through the Drinking Glass*. Until then, happy adventuring.

Collector's Pieces

I dealt last month with my first tentative moves in **Adventure Quest** recounting how I located the orchid – out of reach – some distance due south of the brick building. I also mentioned that I did a little exploring on my way back: It was then that I discovered the pinnacle, Wizard, scroll and staff – or *Stick* as it's called in my version.

From the start, the quickest way to get these is by moving south, south, up, – collect and eat the onion (or garlic) – then up and up to the top of the pinnacle. There you can receive your orders and a supply of food and warmth via the staff – if dropped it flowers and fruits rapidly. The main question revolves round whether it is worth taking up some of your precious carrying allowance to have it along permanently: That's for you to decide.

Anyway, back to the brick building: It's time to go in at long last and see what treasures are within. The first thing to notice is a white dot – a very enigmatic feature at this point in the game. One thing we can be sure of though, is that it isn't there without a purpose.

Inside the building are a bottle of water, some keys, a sling, some fruit and a table. Beginners should note that certain things have obvious uses – like the keys – but that others require a more cautions approach, just in case – the fruit, for example.

It's not unknown for fruit to be poisonous and so it's wise to take precautions before eating any. Because we are at the start of a game, it makes sense to test things out now, not when you are a long way into the adventure and are beginning to receive screen messages such as: *You are getting very hungry.*

If you have a disc-based version eat the fruit at once – it only takes a few seconds to reload if the fatality involves you being dumped unceremoniously out of the game forever.

If you are using a tape-based adventure save first just in case. Mind you, the better quality games ensure that a complete reload is not needed, but it's always better to be safe than sorry.

Once in the building, I remembered that I needed something to stand on if I were to reach the orchid: Could I carry the table? Yes, so off I went out and four moves south, dropped the table and collected the orchid. I left the table where it was because I suspected I was into the start of a complex chaining puzzle.

A chaining puzzle is one where you have to solve a number of elements in turn, creating the links of a chain that eventually ends at the truly valuable treasure.

In my preliminary explorations I had moved north from where I found the onion/garlic and there I came across a unicorn. Now this unicorn was not exactly co-operative – they usually require a virgin to pacify them, if legend is to be believed. However, I wondered if an orchid might do instead.

So once I had stood on the table and collected the orchid I went up (where the onion had been) and north – and the unicorn was still there. Give Orchid proved all that was necessary to get the unicorn to lead me north, eventually to the woodland clearing where a medallion and pan pipes were waiting to be picked up.

I suspected that the medallion was none

Hatter's Helpline

Here's an example of a letter containing requests which – with the best will in the world – I just can't respond to.

Could you please send me a copy of part 1 solution to Bored of the Rings (Micro User August 1989). Please tell me where I could find a copy of Programmers Revenge floppy disc version at a reasonable price.

First of all: No postage included with the letter. Honestly folks, I just can't afford to pay postage on the hundreds of letters I get.

Second: The magazine runs a six month back issues service so that people who miss one can catch up. The real answer is to take out a subscription – or scrounge one for a birthday present – or place a regular order at a newsagent.

Lastly, Programmers Revenge only came out on tape – there never was a disc version. My advice here is to scan the small ads at the back of *The Micro User* and see what's on offer.

I'm a kind hearted old codger who doesn't like disappointing people – specially younger readers – but even I can't work miracles. So remember stamped addressed envelopes make all the difference to my disposition, check out the back issues very carefully and exhaust all possibilities before asking for miracles.

ELITE UPDATE

I've had a long and fascinating letter from Jason Poulton describing some of the features of the PC version of **Elite**. Would you like to have details, or should I use this space mainly for BBC Micro information? Let me know.

Commander Pro asks if there is a third mission. I'd say *No* but for the fact that he doesn't describe his micro and he also says that he encountered and destroyed the Cloak and Dagger Ship. When he did this a cannister was ejected: Pro scooped it up and obtained the Cloaking Device.

That sounds like a 16-bit version, except for the fact that Pro says *I have an original version of Elite* and I know for a fact that the Cloaking Device isn't obtained until mission five in these versions. Pro has only carried out two missions. Curiouser and curiouser, as Alice would say.

Two Toms (Mayo and Reynoldson) are plodding away having succeeded in the first mission. They are well off (Cr 150,000) and good fighters (Right on Commander messages turn up regularly) but also impatient.

Sorry lads, blasting baddies is all you need to do. Stick to Galaxy Three, though. All good things come to those who wait – once enough nasties have bitten the dust.

A. Whitworth has written a lovely letter with some tips for those with a sense of adventure, as quick promotion follows becoming Fugitive. That's true – so long as you can survive. What he/she suggests is trading in narcotics or firearms and blasting following ships with a rear laser as you leave the space station.

Additional comments suggest that not all Vipers have ECM systems and so are vulnerable to missiles. Final advice is as follows: *I would strongly recommend saving positions under two filenames in case one gets wiped.*

I save every single position under a different filename and update at the end of a playing session. Still I may be a bit dotty: After all, I am the Mad Hatter.

Last comment for this month from Jonathan Walton concerning pressing Ctrl+X while paused: He accidentally triggered Galactic hyperspace afterwards, kept his fingers pressed on the two keys until the countdown reached six and then released. He avoided emerging in an Anarchy system as a result. Worth a try.

Look out for a repeat of the famous 1986 Micro User Elite cheat next month.

other than the Talisman, so having collected it I waved it. Sure enough, it was referred to as the Talisman and I was told it emitted a blue light.

While I was at it I blew the pipes and learned that they produced oriental music. I stored that piece of information at the back of my mind for future use and noted it on my map as well.

I reckoned that I was nearly ready to start out on the quest proper, but one thing bothered me: Where was the ammunition for the sling?

I had kept an eye open for five smooth pebbles in the river bed – thinking of the story of David and Goliath – but nothing had turned up. A little more exploring was indicated.

So I carefully wandered round in the forest area and eventually found what I was looking for – a huge oak that looked climbable.

Moves from the building are as follows: south, south, west and then anything up to four moves south again to produce the description that you are *Lost in the Forest beside a huge Oak.* Up I climbed and there, on a branch, was a silver ball.

Back to the building I went and assembled all my goodies ready to set out on my travels. One further thing needs comment: Wolves might well appear, stalk you and eventually kill you – a random event that only takes place in the forest area. It's a bit like the axe-throwing dwarf in Colossal Adventure who only attacks you in tthe central cavern area.

Should the wolves turn up, and it is practicable, try to get back to the building and spend a small amount of time there. If you can't do that, just let yourself be killed. You'll be resuscitated at the top of the pinnacle – and then be given the scroll if you have not already collected it. The sling and ball can be used to scare the wolves off, but I never bothered to do so.

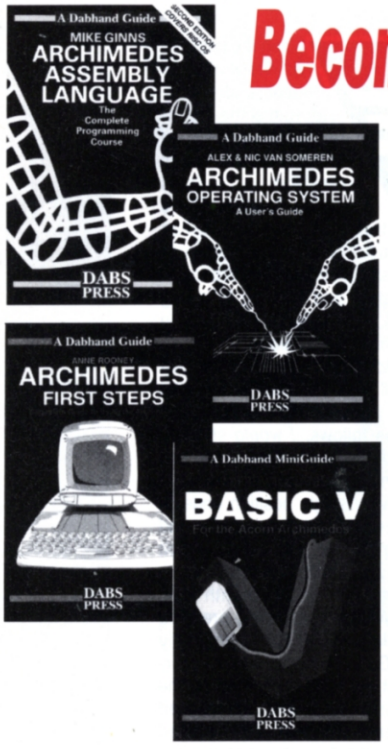
(Continued next month)

Problem Corner

A reader from Iceland, Vidar Steingrimmson, has a problem and I can't help him. Vidar owns an A3000 (good man) and is stuck in the adventure **Rise in Crime.**

Vidar says he is stuck in the Dikki McStikki restaurant with the hamburger. He's almost certain that he needs the burger in the DIY store – so how does he get the burger out?

Become a Dabhand on your Archimedes



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Exile Revisited

James Bonfield extends the effectiveness of his ultimate game cheat

MANY people were delighted with the Exile cheat we published in the December 1990 issue of *The Micro User* but others were not best pleased when the program failed on some versions.

So to make up for the disappointment, here's a new one – with added features that will work on the four 5.25in disc versions.

Basically, there are two different disc protection methods and two different main Exile menu programs – giving four versions in all. The original cheat and mapper programs would only work for one of these four, and not at all if typed in on a Master.

These are the sort of changes that were needed:

- The EQUS, EQUB and EQUD commands replaced with FNequs, FNequb and FNequd.
- A label called *a* – or *.a* has been changed to *aggh*. This will solve some Master problems, as that machine mistakes *INC a+1* for *INC A*.
- Both programs now use the key vector to trap f0 and f2, so you shouldn't press either of these keys when using the programs until the menu has finished being displayed.
- They both look first for the existence of an *EXILEL* file on the disc which is used to detect the version. The only ones that are not accounted for are the Compact, Electron and cassette versions.

There's now an additional program – a saved position editor which will work across the entire range of machines and Exile versions.

Type in each listing in turn, ensure you've made no typing errors using the checksums, and save them as ExCheat, Mapper and ExEdit.

Now everyone can expand their Exile strategy and enjoy the game even more.

```
  10 REM Exile Cheat (V2.2)
  20 REM By James Bonfield
  30 REM (c) The Micro User
  40 IF PAGE<>&1500 THEN PAGE
=&1500:CHAIN"EXCHEAT"
  50 ON ERROR MODE7:REPORT:PR
INT" at line ";ERL:END
  60 MODE7:PRINT'CHR$133"Do y
ou wish to cheat ?";
  70 X$=GET$:PRINTX$
  80 IF INSTR("Nn",X$)THEN D$
="N":W$="N":OS$="N":EF$="N":IE
$="N":FH$="N":GOTO 210
  90 PRINT'CHR$129"Disable ce
rtain events (Y/N): ";
 100 D$=GET$:PRINTD$
 110 PRINTCHR$129"Alter level
                              ➤
```

```
 of water (Y/N): ";
  120 W$=GET$:PRINTW$
  130 IFINSTR("Yy",W$)THENPRIN
T"   ";:PRINTCHR$129;:INPUT"En
ter level (0-255) :"L
  140 PRINTCHR$129"Make doors
open & shut (Y/N): ";
  150 O$=GET$:PRINTO$
  160 PRINTCHR$129"Full energy
 with func. keys (Y/N): ";
  170 EF$=GET$:PRINTEF$
  180 PRINTCHR$129"Infinite en
ergy (Y/N) :";
  190 IE$=GET$:PRINTIE$
  200 PRINT CHR$129"Fire grend
ades/boulders?: ";:FH$=GET$:PR
INT FH$
  210 FORPASS=0TO2STEP2
  220 P%=&1100
  230 [OPTPASS
  240 .loadmc OPT FNequs("LO.
EXILEMC"+CHR$&0D)
  250 .begin2
  260 EOR#&F2
  270 ADC&70
  280 ADC#&97
  290 STA&70
  300 .c
  310 EOR&3000,Y
  320 .d
  330 STA&3000,Y
  340 EOR&70
  350 INY
  360 BNEmore2
  370 INCc+2
  380 INCd+2
  390 PHA
  400 PHP
  410 LDAc+2
  420 CMP#&7F
  430 BEQout2
  440 PLP
  450 PLA
  460 RTS
  470 .more2
  480 JSRbegin2
  490 BNEbegin2
  500 .start2
  510 LDA#&23
  520 STA&70
  530 LDA#&78
  540 LDY#&0
  550 SEC
  560 SEI
  570 JMPbegin2
  580 .out2 JMP out3
  590 .sr
  600 LDX#0
  610 .loopsr
  620 LDArelsr,X
  630 STAz,X
  640 INX
  650 BNEloopsr
  660 \      SELECT CHEAT (B /
MC)
  670 .z
  680 CPX #&D2
  690 BEQ sr
  700 CPX #&F8
  710 BEQsr
  720 \      EXILEB CHEAT
  730 LDX #text MOD 256
  740 LDY #text DIV 256
  750 JSR&FFF7
  760 LDA &78ED:CMP #&78:BEQ o
ut3
  770 LDA #out3 MOD 256:STA ou
t2+1
  780 LDA #out3 DIV 256:STA ou
t2+2
  790 LDA #&12:STA c+2:STA d+2
  800 JMPstart2
  810 .out3
  820 LDA#&EA
  830 STA&71B7
  840 STA&71B8
  850 STA&71B9
  860 ]
  870 IFINSTR("Yy",IE$)THEN[OP
TPASS:STA&3E8E:STA&3E9F:STA&3E
90:]
  880 IFINSTR("Yy",W$)THEN[OPT
PASS:STA&3DCE:LDA#&A9:STA&3DCF
:LDA#L:STA&3DD0:]
  890 [OPTPASS
  900 LDA#&60
  910 STA&4A5F
  920 ]
  930 IFINSTR("Yy",D$)THEN[OPT
PASS:STA&3687:]
  940 IFINSTR("Yy",O$)THEN[OP
TPASS:STA&437F:]
  950 IFINSTR("Yy",EF$)THEN[OP
TPASS:LDA#&A9:STA&3DFA:LDA#&FF
:STA&3DFB:LDA#&9D:STA&3DFC:LDA
#&54:STA&3DFD:LDA#&8:STA&3DFE:
]
  960 IFINSTR("Yy",FH$)THEN [O
PT PASS:LDA #&12:STA &3DDC:LDA
 #&55:STA &3DE1:]
  970 [OPTPASS
```

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```
  980 JMP&78ED
  990 .text OPT FNequs("LO. EX
ILEB"+CHR$&0D)
 1000 .relsr
 1010 \      EXILEMC CHEAT
 1020 LDX #(loadsr-relsr+z) MO
D 256
 1030 LDY #(loadsr-relsr+z) DI
V 256
 1040 JSR &FFF7
 1050 LDA &1900:CMP #&A9:BEQ n
extbit
 1060 LDA#&19
 1070 STAc+2
 1080 STAd+2
 1090 LDA#(nextbit-relsr+z)MOD
256
 1100 STAout2+1
 1110 LDA#(nextbit-relsr+z)DIV
256
 1120 STAout2+2
 1130 JMPstart2
 1140 .nextbit
 1150 LDA#(lmc-relsr+z)MOD256
 1160 STA&1979
 1170 LDA#(lmc-relsr+z)DIV256
 1180 STA&197A
 1190 JMP&1907
 1200 .lmc
 1210 LDX #loadmc MOD 256
 1220 LDY #loadmc DIV 256
 1230 JSR&FFF7
 1240 LDA &1200:CMP #&45:BNE a
lmost
 1250 LDA#&12
 1260 STAc+2
 1270 STAd+2
 1280 LDA#(almost-relsr+z)MOD2
56
 1290 STAout2+1
 1300 LDA#(almost-relsr+z)DIV2
56
 1310 STAout2+2
 1320 JMPstart2
 1330 .almost
 1340 LDA#&60
 1350 STA&4AC6
 1360 LDA#&EA
 1370 STA&7640
 1380 STA&7641
 1390 STA&7642
 1400 ]
 1410 IFINSTR("Yy",IE$)THEN[OP
TPASS:STA&3EBD:STA&3EBE:STA&3E
BF:]
 1420 IFINSTR("Yy",W$)THEN[OPT
PASS:STA&3DFD:LDA#&A9:STA&3DFE
:LDA#L:STA&3DFF:]
 1430 [OPTPASS
 1440 LDA#&60
 1450 ]
 1460 IFINSTR("Yy",D$)THEN[OPT
PASS:STA&36B6:]
 1470 IFINSTR("Yy",O$)THEN[OP
TPASS:STA&43E6:]
 1480 IFINSTR("Yy",EF$)THEN[OP
TPASS:LDA#&A9:STA&3E29:LDA#&FF
:STA&3E2A:LDA#&9D:STA&3E2B:LDA
#&54:STA&3E2C:LDA#&8:STA&3E2D:
]
 1490 IFINSTR("Yy",FH$)THEN [O
PT PASS:LDA #&12:STA &3E0B:LDA
 #&55:STA &3E10:]
 1500 [OPTPASS
 1510 JMP&7D78
 1520 .loadsr EQUS"LO. EXILESR
"+CHR$&0D
 1530 .loadboot
 1540 OPT FNequs("LO. !BOOT"+C
HR$&0D)
 1550 .exile_cheat
 1560 LDA #&5
 1570 LDX #loadmenu MOD 256
 1580 LDY #loadmenu DIV 256
 1590 JSR &FFDD:CMP #0:BNE con
t
 1600 LDX #loadboot MOD 256
 1610 LDY #loadboot DIV 256
 1620 JSR&FFF7
 1630 .start
 1640 LDX#&2C
 1650 .aggh
 1660 LDA&1F10
 1670 .loop
 1680 EOR&1F00,X
 1690 STA&1F00,X
 1700 INX
 1710 BNEloop
 1720 .loop2
 1730 INC&1F13
 1740 INC aggh+1
 1750 LDA&1F13
 1760 CMP#&2C
 1770 BEQloop2
 1780 CMP#0
 1790 BNEstart
 1800 LDA #&60:STA &1FDC:JSR &
1F42
 1810 LDA #&4C:STA &7877
 1820 LDA #cont MOD 256:STA &7
878
 1830 LDA #cont DIV 256:STA &7
879
 1840 JMP &7800
 1850 .cont
```

```
 1860 LDA &228:STA oldkeyv
 1870 LDA &229:STA oldkeyv+1
 1880 LDA #keyv MOD 256:STA &2
28
 1890 LDA #keyv DIV 256:STA &2
29
 1900 LDX #hacker MOD 256
 1910 LDY #hacker DIV 256
 1920 JMP &FFF7
 1930 .keyv
 1940 PHP:PHA
 1950 LDA &EC:CMP #&A7
 1960 BEQ zero
 1970 CMP #&A0
 1980 BEQ zero
 1990 PLA:PLP
 2000 JMP (oldkeyv)
 2010 .zero
 2020 LDA oldkeyv:STA &228
 2030 LDA oldkeyv+1:STA &229
 2040 JSR cheat_on
 2050 PLA:PLP:JMP (oldkeyv)
 2060 .cheat_on
 2070 LDA &39F6:CMP #&F7:BNE c
o2
 2080 LDA #z MOD 256:STA &39F6
 2090 LDA #z DIV 256:STA &39F7
 2100 RTS
 2110 .co2
 2120 LDA #z MOD 256:STA &3BD0
 2130 LDA #z DIV 256:STA &3BD1
 2140 RTS
 2150 .oldkeyv BRK:BRK
 2160 .loadmenu
 2170 OPT FNequb(exilel MOD256
)
 2180 OPT FNequb(exilel DIV256
)
 2190 OPT FNequd(&0):OPT FNequ
d(&0)
 2200 OPT FNequd(&0):OPT FNequ
d(&0)
 2210 .hacker OPT FNequs("*RUN
")
 2220 .exilel OPT FNequs("EXIL
EL"+CHR$&D)
 2230 ]
 2240 NEXT:MODE 7
 2250 PRINT'''CHR$131"INSERT E
XILE DISC AND PRESS ANY KEY":X
=GET
 2260 CALLexile_cheat
 2270 DEFFNequb(A%)
 2280 ?P%=A%:P%=P%+1
 2290 =PASS
 2300 DEFFNequd(A%)
 2310 !P%=A%:P%=P%+4
 2320 =PASS
 2330 DEFFNequs(A$)
 2340 $P%=A$:P%=P%+LEN(A$)
 2350 =PASS
```

Get it right ✓

```
  10 =    0 0
  20 =    0 0
  30 =    0 0
  40 = 82E4 4
  50 = BC2B E
  60 = 8719 8
  70 = 8907 3
  80 = 79A1 1
  90 = 6974 C
 100 = E31A D
 110 = 16A6 A
 120 = 40FB 2
 130 = 41A3 4
 140 = 1F4F A
 150 = 146A 9
 160 = B9C9 3
 170 = 9FDE 6
 180 = EED6 1
 190 = 75D6 D
 200 = C617 E
 210 = 4A5B 2
 220 = E3C5 E
 230 = C8B2 0
 240 = BA7B 8
 250 = 819C D
 260 = 4FDC 7
 270 = DCA9 D
 280 = 97CB D
 290 = A45F E
 300 = 792C E
 310 = 316D 9
 320 =  9CB 4
 330 = 35C2 5
 340 = AE67 C
 350 = 6623 7
 360 = 5E3F 3
 370 =  744 5
 380 = 82D4 3
 390 = 824E 9
 400 = 805E C
 410 = EF83 3
 420 = 18FB 5
 430 = 4735 0
 440 = 4C9A 6
 450 = 4E8A A
 460 = 9843 E
 470 = 5497 F
 480 = E4C6 5
 490 = 88D6 5
 500 =  800 9
 510 = A53C 2
 520 = A45F D
 530 = EBA2 C
 540 = 3A54 A
 550 = 8D00 9
 560 = 2C4A 9
 570 = 2780 7
 580 = 2B03 C
 590 = 9E18 5
 600 = ACA7 B
 610 = 224B 5
 620 = 7A8A D
 630 = BDD7 F
 640 = 7602 1
 650 = 2B01 B
 660 =    0 B
 670 = FA34 E
 680 = EEBD 1
 690 = 55F9 7
 700 = 2995 D
 710 = ED13 6
 720 =    0 6
 730 = 64A2 0
 740 = 6542 9
 750 = 6C8A 7
 760 =   42 5
 770 = 6A6B B
 780 = 1A61 7
 790 = 4DE9 9
 800 = AE1C 3
 810 = BB75 9
 820 = 6A27 E
 830 = 608A 7
 840 = 9165 1
 850 = 8144 C
 860 = 8B58 C
 870 = 1677 D
 880 = 1FF7 0
 890 = C8B2 8
 900 = 599B B
 910 = DC26 B
 920 = 8B58 D
 930 = 262B F
 940 = 45FA 4
 950 = A24B 4
 960 = F2A9 5
 970 = C8B2 C
 980 =  E56 D
 990 = 2E92 D
1000 = E4EC 8
1010 =    0 8
1020 = 1DE4 9
1030 = 1CD3 5
1040 = CECB 4
1050 = 56D6 7
1060 = 5125 4
1070 = 345E A
1080 = B1CE 8
1090 = F323 7
1100 = FB02 8
1110 = 1E4B F
1120 = CB61 F
1130 = AE1C D
1140 = 9577 D
1150 = DD60 4
1160 = F8D0 D
1170 = 3008 2
1180 =  74F A
1190 = A7A7 F
1200 = 5AAD 4
1210 = 750A D
1220 = 9F75 6
1230 = 6C8A 9
1240 = 5F1F 0
1250 = E04E 3
1260 = 345E 7
1270 = B1CE B
1280 = C503 D
1290 = FB02 C
1300 = 286B 7
1310 = CB61 8
1320 = AE1C 6
1330 = 6026 B
1340 = 599B C
1350 =   4E 3
1360 = 6A27 C
1370 = 3702 5
1380 = 2723 3
1390 = 1740 E
1400 = 8B58 2
1410 = D28D 8
1420 = E535 A
1430 = C8B2 D
1440 = 599B C
1450 = 8B58 5
1460 = 3BC5 D
1470 = 32EF 3
1480 = BC0C 2
1490 = A8D8 D
1500 = C8B2 6
1510 = 721F 8
1520 = CB19 2
1530 = DDF2 5
1540 = 4604 5
1550 =  80D 1
1560 = 7A61 2
1570 = B9AA 0
1580 = EDCB 7
1590 = 5D20 3
1600 = FF31 5
1610 = AB50 4
1620 = 6C8A 6
1630 = 3208 7
1640 = 778D 9
1650 = 8992 3
1660 = E46B D
1670 =  325 3
1680 = 7A0F A
1690 = 7EA0 D
1700 = 7602 E
1710 = A1BA D
1720 =  372 0
1730 = E4B8 6
1740 = 8902 2
1750 = D408 2
1760 = B7AB C
1770 = 5ED0 8
1780 = 9388 6
1790 = 38A0 3
1800 = 309A B
1810 = 2055 B
1820 = 2B20 7
1830 = 76D8 B
1840 = 285D A
1850 = A47E A
1860 = 22D4 D
1870 = B9EF 9
1880 = 522F 0
1890 = B4CC 4
1900 = FCBA A
1910 = 16C5 F
1920 =  D8D 5
1930 = 5CDA 3
1940 = 5EFB 0
1950 = 30A6 E
1960 = 498A 2
1970 = E139 A
1980 = 498A 9
1990 = 3885 2
2000 = 18C8 B
2010 = 6E2B 2
2020 = 83CB 2
2030 = 4778 B
2040 = 9003 9
2050 = 1B64 2
2060 = 7262 2
2070 = CA61 F
2080 = 6101 6
2090 = 3CF9 1
2100 = 9843 A
2110 = 5A2A 8
2120 = 4F5C C
2130 = 12A4 C
2140 = 9843 A
2150 =  A3D 1
2160 = EDCD 0
2170 = DEC3 C
2180 = 9A40 1
2190 = 2D50 D
2200 = 2D50 2
2210 = 61E5 A
2220 = 669D F
2230 = 8B58 3
2240 = 4EA6 6
2250 = 5658 C
2260 = 3DB4 E
2270 = 78AE A
2280 = 7751 0
2290 = 4348 9
2300 = B52B D
2310 =  10F F
2320 = 4348 8
2330 = E594 0
2340 = FFF9 5
2350 = 4348 D
```

```
  10 REM Exile Mapper
  20 REM By James Bonfield
  30 REM (C) The Micro User
  40 IF PAGE<>&1900 THEN PAGE
=&1900:CHAIN"MAPPER"
  50 ON ERROR MODE7:REPORT:PR
INT" at line ";ERL:END
  60 FORPASS=0TO2STEP2
  70 P%=&1100
  80 [OPTPASS
  90 .loadboot
 100 OPT FNequs("LO. !BOOT"+C
HR$&0D)
 110 .exile_cheat
 120 LDA #&05
 130 LDX #loadmenu MOD 256
 140 LDY #loadmenu DIV 256
 150 JSR &FFDD:CMP #0:BNE con
t
 160 LDX #loadboot MOD 256
 170 LDY #loadboot DIV 256
 180 JSR&FFF7
 190 .hack
 200 LDX#&2C
 210 .aggh
 220 LDA&1F10
 230 .loop
 240 EOR&1F00,X
 250 STA&1F00,X
 260 INX
 270 BNEloop
 280 .loop2
 290 INC&1F13
 300 INC aggh+1
 310 LDA&1F13
 320 CMP#&2C
 330 BEQloop2
 340 CMP#0
 350 BNE hack
 360 LDA #&60:STA &1FDC:JSR &
1F42
 370 LDA #&4C:STA &7877
 380 LDA #cont MOD 256:STA &7
878
 390 LDA #cont DIV 256:STA &7
879
 400 JMP &7800
 410 .cont
 420 LDA &228:STA oldkeyv
 430 LDA &229:STA oldkeyv+1
 440 LDA #keyv MOD 256:STA &2
28
 450 LDA #keyv DIV 256:STA &2
29
 460 LDX #hacker MOD 256
 470 LDY #hacker DIV 256
 480 JMP &FFF7
 490 .keyv
 500 PHP:PHA
 510 CMP #&F2:BEQ mapmode
 520 CMP #&B1:BEQ mapmode
 530 .keyvout
 540 PLA:PLP:JMP (oldkeyv)
 550 .mapmode
 560 LDA oldkeyv:STA &228:LDA
 oldkeyv+1:STA &229
 570 LDA &355B:CMP #&20:BNE m
apmode2
 580 LDA #mapper MOD 256:STA
&355C:LDA #mapper DIV 256:STA
&355D
 590 JMP keyvout
 600 .mapmode2
 610 LDA #mapper MOD 256:STA
&3382:LDA #mapper DIV 256:STA
&3383
 620 LDA #&FF:STA &1501:STA &
155C
 630 LDA #&AB:STA &155B:LDA #
&26:STA &175B:LDA #&48:STA &17
5C
 640 JMP keyvout
 650 .draw
 660 .x LDA #&9B:STA &18
 670 .y LDA #&3B:STA &1A
 680 LDA &3552:CMP #&20:BEQ d
raw2
 690 JSR &2EEA:JSR &2F80:JSR
&2152
 700 JSR &1DBE:JSR &2445:RTS
 710 .draw2
 720 JSR &30EA:JSR &3180:JSR
&2352
 730 JSR &1FBE:JSR &2645:RTS
 740 .mapper
 750 LDA &3552:CMP #&20:BEQ c
lear2
 760 JSR &2E52:JSR &2F80
 770 LDA &1AB9:STA x+1:LDA &1
ADC:STA y+1
 780 JMP start
 790 .clear2
 800 JSR &3052:JSR &3180
 810 LDA &1CB9:STA x+1:LDA &1
CDC:STA y+1
 820 .start
 830 JSR draw
 840 .loop
 850 JSR &FFE0
 860 PHA
 870 LDA#15:LDX #0:JSR &FFF4
 880 PLA
 890 CMP #&1B
 900 BEQ escape
 910 CMP #&20
 920 BEQ space
 930 CMP #90
 940 BEQ left
 950 CMP #88
 960 BEQ right
 970 CMP #58
 980 BEQ up
 990 CMP #47
1000 BEQ down
1010 JMP loop
1020 .right
1030 INC x+1
1040 JMP start
1050 .left
1060 DEC x+1
1070 JMP start
```

```
➤
 1080 .up
 1090 DEC y+1
 1100 JMP start
 1110 .down
 1120 INC y+1
 1130 JMP start
 1140 .escape
 1150 LDA &355B:CMP #&20:BEQ e
scape2
 1160 JMP &32A0
 1170 .escape2
 1180 JMP &34A0
 1190 .space
 1200 LDA &355B:CMP #&20:BEQ s
pace2
 1210 JMP &3785
 1220 .space2
 1230 JMP &395F
 1240 .oldkeyv BRK:BRK
 1250 .hacker OPT FNequs("RUN
")
 1260 .exilel OPT FNequs("EXIL
EL"+CHR$&0D)
 1270 .loadmenu
 1280 OPT FNequb(exilel MOD256
)
 1290 OPT FNequb(exilel DIV256
)
 1300 OPT FNequd(&0):OPT FNequ
d(&0):OPT FNequd(&0):OPT FNequ
d(&0D)
 1310 ]
 1320 NEXT
 1330 MODE 7:PRINT TAB(5,10)CH
R$131;"PLEASE INSERT EXILE DIS
C"
 1340 X=GET
 1350 CALLexile_cheat
 1360 DEFFNequb(A%)
 1370 ?P%=A%:P%=P%+1
 1380 =PASS
 1390 DEFFNequd(A%)
 1400 !P%=A%:P%=P%+4
 1410 =PASS
 1420 DEFFNequs(A$)
 1430 $P%=A$:P%=P%+LEN(A$)
 1440 =PASS
```

10 = 0 0	80 = C8B2 1	150 = 5D20 0	220 = E46B 2
20 = 0 0	90 = DDF2 8	160 = FF31 A	230 = 325 0
30 = 0 0	100 = 4604 B	170 = AB50 A	240 = 7A0F F
40 = 2F59 9	110 = 80D 6	180 = 6C8A 9	250 = 7EA0 E
50 = BC2B 8	120 = 27DE 2	190 = 34E2 6	260 = 7602 2
60 = 4A5B D	130 = B9AA C	200 = 778D D	270 = A1BA A
70 = E3C5 7	140 = EDCB 8	210 = 8992 D	280 = 372 E

290 = E4B8 8	610 = 2DA9 F						
300 = 8902 0	620 = 2FAD 9						
310 = D408 8	630 = 6FEB 6						
320 = B7AB 3	640 = 8159 F						
330 = 5ED0 3	650 = D43C B						
340 = 9388 A	660 = 7FD0 1						
350 = 4449 4	670 = F49E D	930 = 5589 A	1190 = CAAB B				
360 = 309A 3	680 = 1972 1	940 = 1959 1	1200 = E1C4 3				
370 = 2055 C	690 = 92A 6	950 = E7B0 A	1210 = 1791 E				
380 = 2B20 6	700 = 22A4 E	960 = 11E5 C	1220 = C517 3				
390 = 76D8 C	710 = A1E8 5	970 = 91EC E	1230 = 3438 E				
400 = 285D 4	720 = F068 3	980 = DF1D F	1240 = A3D 4				
410 = A47E 2	730 = 6383 6	990 = 5332 2	1250 = 15E8 3				
420 = 22D4 F	740 = CEDF 3	1000 = D862 1	1260 = 5D95 B				
430 = B9EF 9	750 = D244 9	1010 = EC53 3	1270 = EDCD 1				
440 = 522F 3	760 = 2508 E	1020 = E460 2	1280 = DEC3 D				
450 = B4CC F	770 = 7AFD 0	1030 = 59A0 7	1290 = 9A40 C				
460 = FCBA A	780 = 48C9 9	1040 = 48C9 F	1300 = BDA6 D				
470 = 16C5 D	790 = 6E97 D	1050 = 3EF8 7	1310 = 8B58 A				
480 = D8D 8	800 = 5487 5	1060 = 7008 D	1320 = 2C83 1				
490 = 5CDA 0	810 = 2BA3 6	1070 = 48C9 1	1330 = 8772 6				
500 = 5EFB 5	820 = 3208 4	1080 = 14FC 8	1340 = 61E9 B				
510 = 9B6B 5	830 = B5F9 C	1090 = 4738 E	1350 = 3DB4 A				
520 = A96B 7	840 = 325 F	1100 = 48C9 D	1360 = 78AE 0				
530 = AFA6 9	850 = EB7F E	1110 = FFC3 7	1370 = 7751 5				
540 = 1B64 5	860 = 824E 2	1120 = 6E90 2	1380 = 4348 6				
550 = 97B4 B	870 = B09A 3	1130 = 48C9 6	1390 = B52B 8				
560 = 7E47 A	880 = 4E8A 1	1140 = E93C 7	1400 = 10F 5				
570 = 83A4 6	890 = B7B5 A	1150 = F1F0 3	1410 = 4348 7				
580 = B822 5	900 = D386 2	1160 = 1E05 4	1420 = E594 5				
590 = 8159 E	910 = BC33 A	1170 = 4616 7	1430 = FFF9 5				
600 = 514F 8	920 = 3F2E 6	1180 = ACA5 3	1440 = 4348 B				

```
 10 REM**********************
 20 REM*   EXILE Editor     *
 30 REM* by James Bonfield *
 40 REM* (c)The Micro User *
 50 REM**********************
 60 ON ERROR PROCerror:END
 70 load=&5C00
 80 MODE 7
 90 PROCass
 100 PROCinit
 110 ON ERROR PROCerror:GOTO
120
 120 REPEAT
 130 PROCdisplay_menu
 140 REPEAT S$=GET$
 150 UNTIL INSTR("ABCDEFGHI",
S$)
 160 ON ASC(S$)-64 GOTO 180,2
00,220,240,260,280,300,320,340
 170 UNTIL FALSE
 180 PROCitems
 190 UNTIL FALSE
 200 PROCenergy_got
 210 UNTIL FALSE
 220 PROCenergy_usage
 230 UNTIL FALSE
 240 PROCpockets
 250 UNTIL FALSE
 260 PROCkeys
 270 UNTIL FALSE
 280 PROCteleport
 290 UNTIL FALSE
 300 PROCmisc
 310 UNTIL FALSE
 320 PROCload
 330 UNTIL FALSE
 340 PROCsave
 350 UNTIL FALSE
 360 DEFPROCinit
 370 DIM OB%(15),OB$(15)
 380 FOR A%=0 TO 15
 390 READ OB$(A%),OB%(A%)
 400 NEXT
 410 ENDPROC
 420 DATA "Strange Weapon",&4
7
 430 DATA "Live grenade",&12
 440 DATA "Normal grenade",&5
0
 450 DATA "Coronium rocks",&5
5
 460 DATA "Coronium crystal",
&58
 470 DATA "Boulder",&45
 480 DATA "Destinator",&4A
 490 DATA "Empty glass",&4C
 500 DATA "Full glass",&4D
 510 DATA "Key RCD",&4E
 520 DATA "Cannon RCD",&4F
 530 DATA "Jetpack booster",&
16
 540 DATA "Whistle 1 (Y)",&1E
 550 DATA "Whistle 2 (U)",&1F
 560 DATA "Mushroom imm. pill
",&1D
 570 DATA "Radiation imm. pil
l",&20
 580 DEFPROCtitle(TEXT$,BC%,F
C%)
 590 CLS
 600 FOR T%=0 TO 1:PRINT CHR$
BC%;CHR$157;CHR$FC%;CHR$141;
 610 PRINT SPC(16-LEN(TEXT$)/
2);TEXT$
 620 NEXT
 630 PRINT''
 640 ENDPROC
 650 DEFFNinput(TEXT$)
 660 PRINT CHR$129;TEXT$;CHR$
134;
 670 INPUT ""TEXT$
 680 IF TEXT$="" THEN TEXT$="
0"
 690 =TEXT$
 700 DEFPROCerror
 710 IF ERR=17 THEN ENDPROC
 720 PROCtitle("ERROR**ERROR*
*ERROR**ERROR**ERROR",131,133)
 730 PRINT '''CHR$134;"Error!
!! :-"
 740 PRINT ''
 750 REPORT:PRINT " at line "
;ERL
 760 PRINT TAB(0,23);CHR$129;
CHR$157;CHR$134;"      PRESS S
PACE TO CONTINUE";
 770 REPEAT UNTIL GET=32
 780 ENDPROC
 790 DEFPROCdisplay_menu
 800 PROCtitle("EXILE EDITOR"
,129,134)
 810 RESTORE870
 820 FOR A%=0 TO 8
 830  READ A$:PRINT TAB(2,A%+
5)CHR$132;CHR$(65+A%);".";CHR$
131;A$
 840 NEXT
 850 PRINT ''CHR$134;"Please
select:";
 860 ENDPROC
 870 DATA "WEAPONS/ARMOUR HEL
D"
 880 DATA "ENERGY FOR HELD IT
EMS"
 890 DATA "ENERGY USAGE FOR I
TEMS"
 900 DATA "CONTENTS OF POCKET
S"
 910 DATA "KEYS HELD"
 920 DATA "TELEPORT LOCATIONS
"
 930 DATA "MISC. ITEMS FOUND"
 940 DATA "LOAD POSITION"
 950 DATA "SAVE POSITION"
 960 DEFPROCload
 970 PROCtitle("LOAD POSITION
",132,131)
 980 F$=FNinput("Please enter
 filename :")
 990 OSCLI"LOAD "+F$+" "+STR$
~load
 1000 CALL decode
 1010 ENDPROC
 1020 DEFPROCsave
 1030 PROCtitle("SAVE POSITION
",132,131)
 1040 F$=FNinput("Please enter
 filename :")
 1050 CALL encode
 1060 OSCLI"SAVE "+F$+" "+STR$
~load+"+400 0"
 1070 CALL decode
 1080 ENDPROC
 1090 DEFPROCass
 1100 FOR PASS=0 TO 2 STEP 2:P
%=&900
 1110 [OPT PASS
 1120 .decode
 1130 LDA #&0:STA eor1+1
 1140 LDA #load DIV &100:STA e
or1+2
 1150 STA eor2+2:STA eor3+2
 1160 LDX #&83
 1170 LDY #&FC
 1180 LDA #&00
 1190 .eor1 EOR load
 1200 INC eor1+1
 1210 BNE loop1
 1220 INC eor1+2
 1230 .loop1 INX
 1240 BNE eor1
 1250 INY
 1260 BNE eor1
 1270 STA pos1+1
 1280 SEC:SED
 1290 LDA #&82
 1300 STA &72
 1310 LDA #&FC
 1320 STA &73
 1330 LDY #&00
 1340 LDA #&6E
 1350 STA &71
```

```
1360 LDA #&92
1370 .loop3 ADC &71
1380 ADC #&15
1390 STA &71
1400 .eor2 EOR load,Y
1410 .eor3 STA load,Y
1420 EOR &71
1430 INY
1440 BNE loop2
1450 INC eor2+2
1460 INC eor3+2
1470 .loop2 INC &72
1480 BNE loop3
1490 INC &73
1500 BNE loop3
1510 CLD
1520 .pos1 LDA #&64
1530 EOR load+&37D
1540 EOR #&9F
1550 STA load+&35A
1560 LDA #&43
1570 STA load+&37D
1580 RTS
1590 .encode
1600 SED:SEI
1610 SEC
1620 LDA #load DIV &100:STA p
os2+2
1630 LDA #load DIV &100+4:STA
pos3+2
1640 LDA #&6E
1650 STA &7D
1660 LDA #&92
1670 LDX #&4
1680 LDY #&0
1690 .loop7 ADC &7D
1700 ADC #&15
1710 STA &7D
1720 .pos2 LDA load,Y
1730 PHA
1740 EOR load+&35A
1750 STA load+&35A
1760 PLA
1770 EOR &7D
1780 PHA
1790 EOR load+&37D
1800 STA load+&37D
1810 PLA
1820 .pos3 STA load+&400,Y
1830 INY
1840 BNE loop7
1850 INC pos2+2
1860 INC pos3+2
1870 DEX
1880 BNE loop7
1890 LDX #0
1900 CLD
1910 .loop8
1920 LDA load+&400,X:STA load
,X
1930 LDA load+&500,X:STA load
+&100,X
1940 LDA load+&600,X:STA load
+&200,X
1950 LDA load+&700,X:STA load
+&300,X
1960 INX:BNE loop8
1970 CLI
1980 RTS
1990 ]
2000 NEXT
2010 ENDPROC
2020 DEFPROCitems
2030 PROCtitle("WEAPONS/ARMOU
R HELD",132,131)
2040 RESTORE 2200
2050 FOR A%=0 TO 4
2060 READ A$
2070 PRINT TAB(2,A%+5);CHR$13
3;CHR$(A%+65);"."CHR$134;A$;SP
C(25-POS);
2080 IF A%?(load+&17)=&FF THE
N PRINTCHR$132"GOT     " ELSE P
RINTCHR$129"NOT GOT"
2090 NEXT
2100 PRINT ''
2110 PRINTCHR$132;"Press A to
E to toggle"
2120 PRINTCHR$132;"Press Q to
quit"
2130 REPEAT S$=GET$
2140 UNTIL INSTR("ABCDEQ",S$)
2150 IF S$="Q" THEN ENDPROC
2160 L%=ASC(S$)+load-42
2170 IF ?L%=0 THEN ?L%=&FF EL
SE ?L%=0
2180 GOTO 2040
2190 DATA "JETPACK"
2200 DATA "PISTOL","ICER","BL
ASTER","PLASMA GUN","PROTECTIO
N SUIT"
2210 DEFPROCenergy_got
2220 @%=&20309
2230 PROCtitle("WEAPONS/ARMOU
R ENERGY LEVELS",132,131)
2240 PRINTTAB(5)CHR$131;"ITEM
";TAB(26);"ENERGY"
2250 RESTORE 2190
2260 FOR A%=0 TO 5
2270 READ A$
2280 PRINT TAB(2,A%+6);CHR$13
3;CHR$(A%+65);"."CHR$134;A$;SP
C(25-POS);
2290 PRINT CHR$132;(A%?(load+
&5C)*256+A%?(load+&56))/2048;S
PC(33-POS);"MJ";
2300 NEXT
2310 PRINT ''
2320 PRINTCHR$132;"Press A to
F to enter new ammount"
2330 PRINTCHR$132;"Press Q to
quit"
2340 REPEAT S$=GET$
2350 L%=ASC(S$)-65
2360 UNTIL INSTR("ABCDEFQ",S$
)
2370 IF S$="Q" THEN ENDPROC
2380 PRINT TAB(0,18);
2390 A%=VAL(FNinput("Please e
nter new energy :"))*2048
2400 PRINT TAB(0,18);STRING$(
239," ")
2410 L%?(load+&5C)=A% DIV &10
0:L%?(load+&56)=A% MOD &100
2420 GOTO 2250
2430 DEFPROCenergy_usage
2440 @%=&20109
2450 PROCtitle("ENERGY COMSUM
PTION RATES",132,131)
2460 PRINTTAB(5)CHR$131;"ITEM
";TAB(23);"RATE"
2470 RESTORE 2190
2480 FOR A%=0 TO 4
2490 READ A$
2500 PRINT TAB(2,A%+6);CHR$13
3;CHR$(A%+65);"."CHR$134;A$;SP
C(22-POS);
2510 PRINT CHR$132;A%?(load+&
62)/2;SPC(29-POS);"KJ/";
2520 IF A%=0 OR A%=3 THEN PRI
NT "second" ELSE PRINT"bullet"
2530 NEXT
2540 PRINT ''
2550 PRINTCHR$132;"Press A to
E to enter new rate"
2560 PRINTCHR$132;"Press Q to
quit"
2570 REPEAT S$=GET$
2580 L%=ASC(S$)-65
2590 UNTIL INSTR("ABCDEQ",S$)
2600 IF S$="Q" THEN ENDPROC
2610 PRINT TAB(0,18);
2620 A%=VAL(FNinput("Please e
nter rate :"))*2
2630 PRINT TAB(0,18);STRING$(
239," ")
2640 L%?(load+&62)=A% MOD &10
0
2650 GOTO2470
2660 DEFPROCpockets
2670 @%=9
2680 PROCtitle("POCKET CONTEN
TS",132,131)
2690 PRINT TAB(0,5)CHR$134;"N
o. of pockets used :";CHR$132;
load?&4F
2700 FOR A%=0 TO 3
2710 IF A%<load?&4F THEN PRIN
T CHR$134; ELSE PRINT CHR$133;
2720 PRINT "Contents of pckt
";CHR$(65+A%);"  :";
2730 IF A%<load?&4F THEN PRIN
T CHR$132; ELSE PRINT CHR$133;
2740 B%=load?(A%+&50)
2750 OB%=-1
2760 REPEAT OB%=OB%+1
2770 UNTIL OB%=11 OR OB%(OB%)
=B%
2780 IF OB%=11 THEN OB$="Dunn
o" ELSE OB$=OB$(OB%)
2790 PRINT OB$
2800 NEXT
2810 PRINT TAB(0,10)
2820 PRINTCHR$132;"Press A to
D to change contents"
2830 PRINTCHR$132;"Q to quit,
N to change no. pockets"
2840 REPEAT S$=GET$
2850 UNTIL INSTR("ABCDNQ",S$)
2860 IF S$="Q" THEN ENDPROC
2870 PRINT '
2880 IF S$="N" THEN PROCpocke
t_num ELSE PROCpocket_content
2890 IF S$="N" THEN GOTO2690
ELSE GOTO 2680
2900 DEFPROCpocket_num
2910 load?&4F=VAL(FNinput("En
ter new no. of pockets :")) MO
D 5
2920 PRINT TAB(0,15)STRING$(1
11," ")
2930 ENDPROC
2940 DEFPROCpocket_content
2950 A%=ASC(S$)-65
2960 PROCtitle("CONTENTS FOR
POCKET "+S$,129,131)
2970 FOR B%=0 TO 10
2980 PRINT TAB(2);CHR$133;CHR
$(B%+65);".";CHR$134;OB$(B%)
2990 NEXT
3000 PRINT'CHR$129;"Current c
ontents :"CHR$134;OB$(OB%)
3010 PRINT'CHR$132"Press A to
K for new contents"
3020 REPEAT S$=GET$
3030 UNTIL S$>="A" AND S$<="K
"
3040 load?(A%+&50)=OB%(ASC$$-
65)
3050 ENDPROC
3060 DEFPROCkeys
3070 PROCtitle("KEYS HELD",13
2,131)
3080 PRINT CHR$134;"Current k
eys held :";CHR$133;
3090 B%=0
3100 FOR A%=0 TO 7
3110 IF load?(A%+&E)=0 THEN 3
150
3120 IF B%<>0 THEN PRINT ",";
3130 PRINT CHR$(A%+65);
3140 B%=B%+1
3150 NEXT
3160 IF B%=0 THEN PRINT "NONE
"
3170 PRINT ''CHR$132;"Keys to
choose from are"CHR$129"A"CHR
$132"to"CHR$129"H"
3180 PRINT'CHR$132;"Pressing
a letter (A-H) toggles key"
3190 PRINTCHR$132;"Press Q to
quit"
3200 REPEAT S$=GET$
3210 UNTIL INSTR("ABCDEFGHQ",
S$)
3220 IF S$="Q" THEN ENDPROC
3230 L%=ASC(S$)-51
3240 IF load?L%=0 THEN load?L
%=&FF ELSE load?L%=0
3250 GOTO3070
3260 DEFPROCteleport
3270 @%=&9
3280 PROCtitle("TELEPORT LOCA
TIONS",132,131)
3290 PRINT CHR$134;"No. of te
leports remembered :"CHR$129;l
oad?&2A
3300 PRINT TAB(23,7);CHR$131;
"X    Y"
3310 FOR A%=0 TO 3
3320 IF A%<load?&2A THEN PRIN
T CHR$134; ELSE PRINT CHR$133;
3330 PRINT "Teleport location
";CHR$(A%+65);" :";
3340 IF A%<load?&2A THEN PRIN
T CHR$132; ELSE PRINT CHR$133;
3350 PRINT TAB(23);"&";~load?
(&2B+(A%+load?&29)MOD 4);SPC(2
6-POS);"  &";~load?(&30+(A%+lo
ad?&29)MOD 4)
3360 NEXT
3370 PRINT TAB(0,14);CHR$132;
"Press A to D to change telepo
rt loc."
3380 PRINT CHR$132;"Q to quit
, N to change no. of teleports
";
3390 REPEAT S$=GET$
3400 UNTIL INSTR("ABCDQN",S$)
3410 IF S$="Q" THEN ENDPROC
3420 PRINT':A%=ASC(S$)-65
3430 IF S$="N" THEN load?&2A=
VAL(FNinput("Enter new no. of
tele's remembered :")) MOD 5:G
OTO 3280
3440 load?(&2B+(A%+load?&29)M
OD 4)=EVAL(FNinput("New X coor
dinate (Hex) :"))
3450 load?(&30+(A%+load?&29)M
OD 4)=EVAL(FNinput("New Y coor
dinate (Hex) :"))
3460 GOTO 3280
3470 DEFPROCmisc
3480 @%=&1
3490 PROCtitle("MISCELANEOUS
PIECES",132,131)
3500 PRINT CHR$131;TAB(6);"It
em";TAB(25);"Used / got"
3510 FOR A%=0 TO 4
3520 PRINT TAB(2,A%+6);CHR$13
```

➤

```
3;CHR$(A%+65);"."CHR$134;OB$(A
%+11);SPC(28-POS);
 3530  IF load?OB%(A%+11)=0 TH
EN PRINTCHR$129;"No" ELSE PRIN
T CHR$132;"Yes"
 3540 NEXT
 3550 PRINT TAB(2,12)CHR$133;"
F.";CHR$134;"Your X coordinate
";SPC(28-POS);CHR$132;~load?&9
9
 3560 PRINT TAB(2)CHR$133;"G."
;CHR$134;"Your Y coordinate";$
SPC(28-POS);CHR$132;~load?&BC
 3570  PRINT 'TAB(2)CHR$133;"H
.";CHR$134;"Time :";SPC(16-POS
);CHR$131;
 3580 time=load!7/50
 3590 days=time DIV 86400:hour
s=(time MOD 86400) DIV 3600
 3600 mins=(time MOD 3600) DIV
 60:secs=(time MOD 60)
 3610 PRINT days;" day";:IF da
ys=1 THEN PRINT ",";ELSE PRIN
T "s,";
 3620 PRINT hours;" hour";:IF
hours=1 THEN PRINT ",";ELSE P
RINT "s,";
 3630 PRINT TAB(16);CHR$131;mi
ns;" min";:IF mins=1  THEN PRI
NT ",";ELSE PRINT "s,";
 3640 PRINT secs;" sec";:IF se
cs=1 THEN PRINT "." ELSE PRINT
"s."
 3650 PRINT ''CHR$132;"Press A
 to H to alter stat"
 3660 PRINT CHR$132;"Or press
Q to quit"
 3670 REPEAT S$=GET$
 3680 UNTIL INSTR("ABCDEFGHQ",
S$)
 3690 IF S$="Q" THEN ENDPROC
 3700 IF INSTR("ABCDE",S$) THE
N PROCmisc_toggle:GOTO 3480
 3710 IF INSTR("FG",S$) THEN P
ROCmisc_pos:GOTO 3480
 3720 VDU 28,0,23,39,22
 3730 days=VAL(FNinput("Enter
number of days :"))
 3740 hours=VAL(FNinput("Enter
 number of hours :"))
 3750 mins=VAL(FNinput("Enter
number of minutes :"))
 3760 secs=VAL(FNinput("Enter
number of seconds :"))
 3770 time=(days*3600*24+hours
*3600+mins*60+secs)*50
 3780 load!7=time
 3790 VDU 28,0,24,39,0
 3800 GOTO 3480
 3810 DEFPROCmisc_toggle
 3820 A%=ASC(S$)-54
 3830 IF load?(OB%(A%))=&FF TH
EN load?(OB%(A%))=&00 ELSE loa
d?(OB%(A%))=&FF
 3840 ENDPROC
 3850 DEFPROCmisc_pos
 3860 PRINT
 3870 IF S$="F" THEN new_x=EVA
L("&"+FNinput("Enter new X coo
rd (Hex) :")) ELSE new_x=load?
&99
 3880 IF S$="G" THEN new_y=EVA
L("&"+FNinput("Enter new Y coo
rd (Hex) :")) ELSE new_y=load?
&BC
 3890 load?&99=new_x
 3900 load?&BC=new_y
 3910 ENDPROC
```

```
 10 =    0 0
 20 =    0 0
 30 =    0 0
 40 =    0 0
 50 =    0 0
 60 = 917E E
 70 = 37C6 D
 80 = 1092 4
 90 = CD80 5
100 = DEBB 7
110 = CBA6 9
120 = BFBA C
130 = 4DBA A
140 = 5B34 1
150 = C915 9
160 = 1684 7
170 = 226C F
180 = 60C1 2
190 = 226C F
200 =  9B0 C
210 = 226C 4
220 =  F22 4
230 = 226C 6
240 = 9660 6
250 = 226C 9
260 = B0B6 D
270 = 226C 5
280 = 6CA5 A
290 = 226C B
300 = 1FB4 F
310 = 226C 6
320 = CE56 E
330 = 226C F
340 = 9DDB E
350 = 226C A
360 = 344C 1
370 = FA83 D
380 = 97E7 5
390 =  9B6 8
400 = 2C83 3
410 = EDOF 4
420 = AFD1 8
430 = 693E 1
440 = F714 2
450 = 6926 E
460 = 5B6D D
470 = 71CB 1
480 = 5F50 0
490 = C6D6 6
500 = 6F50 F
510 = B3A2 0
520 = FDEA C
530 = 73F2 8
540 = 338A 2
550 = E04D 0
560 = 2E69 8
570 = 62B1 3
580 = 4B2A B
590 = 7A16 F
600 = 8B2B D
610 = 8E37 4
620 = 2C83 A
630 = 1F96 B
640 = EDOF E
650 = 542D 8
660 = B4BA B
670 = BA42 7
680 = 29AD 1
690 = 7ED0 3
700 = D7A7 7
710 = 2DDF 8
720 = 92F1 A
730 = A228 7
740 = A4CB 8
750 = CDBE A
760 =  685 7
770 = 2B9E D
780 = EDOF 9
790 = 9A23 8
```

```
800 =  86A 4
810 = A47A 3
820 = A3CE 1
830 = 3A24 D
840 = 2C83 E
850 = 19CE D
860 = EDOF 6
870 = E6F2 8
880 = 80AD E
890 = AEDD F
900 = A471 2
910 = CBD9 7
920 = BBD2 3
930 = EA2E C
940 = B967 C
950 = 879E 1
960 = 24A1 8
970 = 3990 F
980 = 22FF C
990 = E1B9 2
1000 = 3553 7
1010 = EDOF 3
1020 = 7A2C 9
1030 = AA61 D
1040 = 22FF 1
1050 = 9C0C E
1060 = 27AA 4
1070 = 3553 8
1080 = EDOF E
1090 = DB18 4
1100 = 6917 0
1110 = DD44 0
1120 = B1F5 7
1130 = B782 3
1140 = E1E0 B
1150 = 6068 6
1160 = 9CD7 E
1170 = 8CB6 5
1180 = 777B 0
1190 = E423 B
1200 = EA33 3
1210 = E686 F
1220 = DA50 7
1230 = 822A 1
1240 = AD33 6
1250 = 6623 4
1260 = AD33 0
1270 = F695 5
1280 = 5D1B E
1290 = DE90 B
1300 = 7622 9
1310 = 9B70 C
1320 = 6603 4
1330 = 60BD C
1340 = F3EF 2
1350 = 4641 1
1360 = EDA1 2
1370 = F362 7
1380 = C9CB 6
1390 = 4641 0
```

```
1400 = F1EF 8
1410 = F581 0
1420 = DF0B 0
1430 = 6623 B
1440 = D6E5 A
1450 = 8300 D
1460 = B430 A
1470 = 3D8D 0
1480 = C6C4 A
1490 = 7A33 0
1500 = C6C4 2
1510 =  41C 4
1520 = 87DF 0
1530 = A7B2 1
1540 = 582F 6
1550 = 40F5 C
1560 = 8BDC B
1570 = 7632 0
1580 = 9843 C
1590 = 18AA E
1600 = EB62 C
1610 = 8D00 1
1620 = 9781 C
1630 = 8F33 4
1640 = F3EF 5
1650 = 6873 A
1660 = EDA1 F
1670 = C666 5
1680 = 2CB3 2
1690 = 41BF 2
1700 = C9CB 3
1710 = 6873 6
1720 = 598A B
1730 = 824E 1
1740 = 9175 2
1750 = 40F5 F
1760 = 4E8A 7
1770 = F139 8
1780 = 824E B
1790 = A7B2 A
1800 = 7632 6
1810 = 4E8A C
1820 = B2B8 4
1830 = 6623 1
1840 = 8640 5
1850 = AC31 C
1860 = 9B01 C
1870 = E8A9 B
1880 = 8640 6
1890 = EA45 C
1900 =  41C 7
1910 = A238 2
1920 = F966 C
1930 = 3769 1
1940 = B780 0
1950 = C827 1
1960 = 24AC E
1970 = D5B1 B
1980 = 9843 1
1990 = 8B58 2
```

```
2000 = 2C83 8
2010 = EDOF D
2020 = CBA5 F
2030 =  AAC 3
2040 = FFE5 3
2050 = 6242 9
2060 = D84C 8
2070 = E9CF E
2080 = BF97 9
2090 = 2C83 4
2100 = A4CB 0
2110 = CE6D 9
2120 = 8314 5
2130 = 5B34 9
2140 = 7E24 2
2150 = 2212 C
2160 = EA78 4
2170 =  BF8 C
2180 = DA4B 2
2190 = 1A3E 8
2200 = 9A23 8
2210 = 5C08 4
2220 = 3DFF 9
2230 = AADD E
2240 = 59AE 7
2250 = 5630 7
2260 = 7263 F
2270 = D84C 5
2280 = 920C 8
2290 = B67E 1
2300 = 2C83 4
2310 = A4CB E
2320 = D29B B
2330 = 8314 1
2340 = 5B34 D
2350 = EA8B D
2360 = D9A6 B
2370 = 2212 9
2380 = 7D99 F
2390 =  BA0 0
2400 = 35FB 9
2410 = 3304 8
2420 = 4853 0
2430 = D8BB F
2440 = 539F 0
2450 = CB81 6
2460 = 7C14 F
2470 = 5630 7
2480 = 6242 3
2490 = D84C A
2500 = F5D8 6
2510 = 6CF4 A
2520 = FD97 5
2530 = 2C83 A
2540 = A4CB B
2550 = 3B27 C
2560 = 8314 5
```

```
2570 = 5B34 4
2580 = EA8B 1
2590 = 7E24 9
2600 = 2212 5
2610 = 7D99 6
2620 = C17D 8
2630 = 35FB D
2640 = 401C 5
2650 = 804C E
2660 = 7BC6 8
2670 = D719 C
2680 = FF14 2
2690 = 4C17 7
2700 = 12A5 F
2710 = AF7A F
2720 = F6E4 5
2730 = A444 5
2740 = 2B73 3
2750 = A0CF 7
2760 = 2C63 9
2770 = 23EF F
2780 = A120 1
2790 = 9C9D 9
2800 = 2C83 D
2810 =   53 D
2820 = F482 7
2830 = 6D2C C
2840 = 5B34 D
2850 = 350B B
2860 = 2212 1
2870 = 8601 3
2880 = 55B7 5
2890 = EB24 7
2900 = 26BA B
2910 = D215 E
2920 = 76E4 D
2930 = EDOF 6
2940 = 5F9E 9
2950 = C10B 9
2960 = 9F79 D
2970 = EA06 9
2980 = C11C 9
2990 = 2C83 4
3000 = 6F38 7
3010 = 41E9 D
3020 = 5B34 8
3030 = 555A 6
3040 = 338D D
3050 = EDOF 6
3060 = 5A41 D
3070 = 84EE A
3080 = 1D4F 4
3090 = AB58 3
3100 = 5221 B
3110 = 8772 7
3120 = FE9E E
3130 = 4AE1 9
```

```
3140 = F43E E
3150 = 2C83 A
3160 = 95FC 1
3170 = D0A6 4
3180 = C9E4 1
3190 = 8314 A
3200 = 5B34 3
3210 = DED3 E
3220 = 2212 A
3230 = FF5C 6
3240 = BB56 C
3250 = 69B7 8
3260 = E626 2
3270 = 16AD C
3280 = 6099 8
3290 = C656 9
3300 = D8FF 9
3310 = 12A5 B
3320 = DA0B C
3330 = B7C9 5
3340 = D135 4
3350 = 8469 2
3360 = 2C83 5
3370 =  78E 0
3380 = A2B9 F
3390 = 5B34 4
3400 = 571E A
3410 = 2212 5
3420 = 3E41 0
3430 = BBA9 B
3440 = CCAA B
3450 =  D52 A
3460 = E46F D
3470 = F543 3
3480 = 97A5 0
3490 = 8A1D 2
3500 = 9025 D
3510 = 6242 9
3520 = D757 B
3530 = 9AC1 D
3540 = 2C83 E
3550 = 1DC5 B
3560 = BF37 B
3570 = 18F0 F
3580 = A223 0
3590 = E8F4 E
3600 = 59B9 9
3610 = 72B9 0
3620 = CAD2 F
3630 = 7B21 9
3640 = 8CF4 4
3650 = 99D4 3
3660 = 8FF0 9
3670 = 5B34 3
3680 = DED3 C
3690 = 2212 D
3700 = 99D3 3
3710 = FAED 5
3720 = F9E9 3
3730 = 7146 F
3740 = 3ED4 6
3750 =  57D C
3760 = A338 F
3770 = A752 2
3780 = 41D6 7
3790 = 1F73 5
3800 = 3E84 4
3810 = C9E9 3
3820 = 8479 C
3830 = DF90 9
3840 = EDOF 5
3850 = 4BC8 5
3860 = FF3E B
3870 = DDB9 3
3880 = F2A1 0
3890 = 9C49 A
3900 = 9DE4 2
3910 = EDOF E
```

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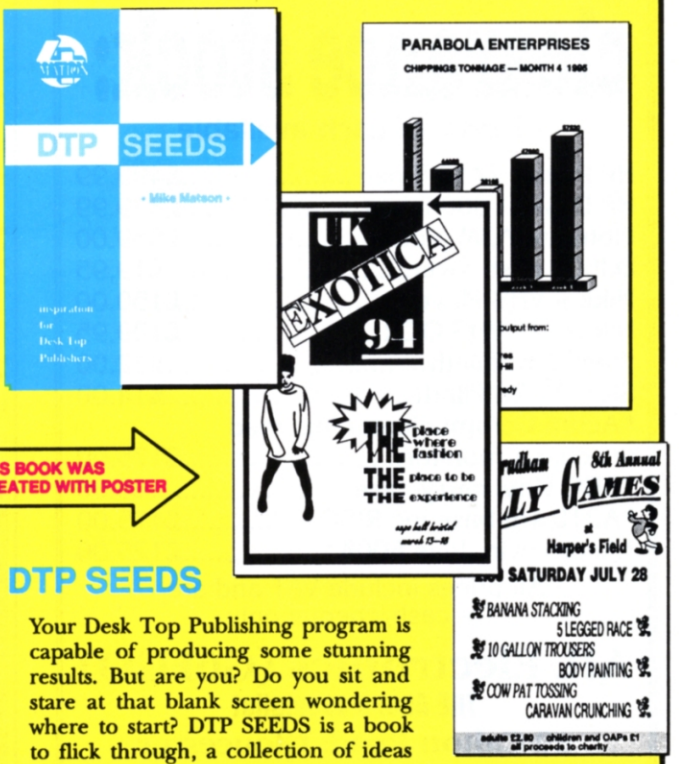

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Sussing out those structured programs

ALTHOUGH it is widely acknowledged that structured programming is the best thing since sliced bread, Kylie Minogue and lead-free pencils, it's not always easy to determine whether a given program is structured or not.

The following short routine – especially written for this month's issue – solves the problem at a stroke:

```
*Key8 M%=!&17 AND&FF00:REPEATM
%?1=0:M%?2=0:M%=M%+M%?3:UNTILM
%?1>127|MRUN|M
```

Load your program in the normal way and press f8. This will modify the program in a way that was previously thought to be impossible and, indeed, one authority has described as Silly.

If the program runs then well and good, it is properly structured and you can present yourself with the Structured Programmers Order of Fellowship award. Otherwise it's back to the drawing board for more practice until you do qualify for a SPOoF award.

Seriously though, this demonstrates the fact that the BBC Micro does not use line numbers in loops, procedures or functions, but instead stores the actual memory locations the first time they are called.

This enables programs to run faster and is a good reason for avoiding GOTO and GOSUB as structured programmers are supposed to. – **Phil Bender, Romford, Essex.**

...in a tenner

WANT to write to The Micro User? The addess is: Letters, The Micro User, Europa House, Adlington Park, Adlington, Macclesfield, SK10 4NP.

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Patiently playing on

MY wife and I find King Albert Patience from the May 1990 issue a most entertaining game and have enjoyed many happy hours playing it on the Master 128.

We now have an A3000 and, of course, it will not run unless I use the 65 Host, then it is so slow one looses interest.

Please does anyone know how to make it run on the A3000? – A.J. Williams, Chudleigh, Newton Abbot

● King Albert Patience must be one of the most thought-provoking games we've had in The Micro User. However, we never got round to converting it for the 32 bit machines.

If anyone has done so we'd be pleased to put it on the monthly disc.

Can't find the scrap

WITH reference to The Micro User December 1990 Archimedes software disc received. In attempting to unpack the archived PD-Stuff files, I find that it calls for Application 1 suite file !System.scrapfile.

This cannot be found on my A3000 version 1.10 !System file. Your advice would be appreciated. – D. C. J. West, Maidenhead, Berks.

● What's happening is this: The !Sparkplug utility is trying to unpack a file and creates the *scrapfile* to do it. But there isn't room on your Apps disc 1, so it fails.

However, !Sparkplug always assumes it's successful and then tries to open this file – which it then cannot find.

The solution is to copy !System on to a blank disc. Press Control+Reset, and restart but use the new system disc instead of Apps1.

Trying to add ram

I OWN a second hand issue 7 Model B fitted with an ATPL Sideways Rom/Ram Board which lets me add sideways ram. But without the documentation I don't know what to fit or where. Can you help? – M.C. Routledge, Rochester, Kent.

● We haven't used this particular board. Can any reader provide the necessary information?

Faster arrays

HERE's a demonstration of a fast method of loading either real or integer arrays. Many

➤

Sounds interesting

ANYONE who owns any Archimedes games may possess more than they realise, as they contain numerous sound voices that can be used in conjunction with !Maestro or in your own programs.

To get hold of them all you have to do is double-click the game icon with Shift held down then see what you've got.

Sometimes there'll be a sub-directory called Sounds or Samples, in other games the file names give away their contents. In any case, the sounds will be Relocatable Modules – the icons have the letters RM in the corner.

The easiest way to hear the voices is to load them up by double-clicking, then press F12 and type *Voices which displays all the ones you have loaded along with the nine default voices. To hear an individual voice type:

```
*ChannelVoice 1 <voice>
```

In place of <voice type in its number – you can use the full name in this command but the number is quicker. Once you have done this press Return and then Copy.

If you find the sample is too fast you can use the *Tuning command to slow it down:

```
*Tuning -&1000
```

This will lower the pitch by one octave.

When used with !Maesto or other music software some very amusing and weird effects can be obtained. – William Glendinning, Crowthorne, Berks.

➤

programs begin by loading a data file into an array which, if large, can be very tedious.

If the array is the first variable above LOMEM and its dimensions are known, it can be saved with *SAVE.

On subsequent runs this file can be recovered with a *LOAD about 10 times faster than reading in the array number by number. But for both loading and saving there must be no other variables defined before the array.

```
10@%=&5:*K.100.|ML.|L|M
20X%=10:Y=10:DIM D(X%,Y%)
30FORI=0TOX%:FORJ=0TOY%:D(I,
J)=I*J:NEXT:NEXT
40FORI=0TOX%:FORJ=0TOY%:PRIN
TD(I,J),,:NEXT:PRINT:NEXT
500SCLI("*SAVE ARRAY "+STR$~
LOMEM+" "+STR$~((X%+1)*(Y%+
1)*5))
60CLEAR :DIM A(X%,Y%)
700SCLI("*LOAD ARRAY "+STR$~
LOMEM)
80FORI=0TOX%:FORJ=0TOY%:PRIN
T A(I,J),,:NEXT:PRINT:NEXT
90END
```

– **Steve Robinson, Coleraine, N. Ireland.**

Completing the set

I THINK you'll be pleased to know of the response I had to my classified offering a complete set of The Micro User magazines from March 1983. I have had more than 20 calls and could have sold them many times over.

Unfortunately, having sold them and posted them to a buyer in Scotland, the Post Office managed to smash the parcels open and lose some of the magazines. In order to complete the set again the following back issues are urgently needed:
April, October and December 1987; January, February and April 1989.
I would be grateful if you would send me an indication of whether these issues are still available from you, and details of the pricing. – G. J. Monney, Brentwood, Essex.

● Unfortunately we're out of these copies. Can anyone help?

Wrong sized disc

WITH reference to the PD page on 8-bit computers, is there any company that produces 8-bit P.D. on 3.5in disc? Or will I have to get a 5.25in disc drive to run the software on my Master Compact? – **Toby Bryans, Wembley Park, Middx.**

● All you can do is write to the PD suppliers and see what they say. Maybe one can fill your need.

Assembling big programs

WHILE working on a large arcade adventure I came across a strange bug in the Basic assembler on my Master 128. I wanted to use the instruction:

```
CPY &4F0,X
```

Reasonable enough, but the routine didn't work. I eventually traced it down to that fact that this instruction was being interpreted as:

```
CPY &4F0
```

without the index. Looking in the manual revealed that the indexed version doesn't exist any way, but no error was reported.

Another more common bug is the failure of the assembler to report an error if a colon is missed out between instructions.

To save printer paper – and memory – I usually pack several instructions on to one line, so debugging can be a nightmare.

As regards writing huge machine code programs, I always use this Master-based method for assembling and testing:

Set up the first two banks of SWR to pseudo-addressing using the *SRDATA command. Then initialise the following function keys:

```
*KEY0 *SRWRITE 3000 8000 0
*KEY1 MODE135|M*SRREAD 3000
8000 0
OSCLI("KEY2 CALL"+STR$start)
```

where start is the execution address of the code.

Set PAGE to &3000 then load or type in your program. Having start as &E02 is the most useful. f0 writes the program to sideways ram, f1 reads it and f2 calls it.

The other advantages of this method is that you can go back to the work without having to load from disc every time. – **Simon Storr, Lincoln.**

● Thanks for the assembling tip. It's a *feature* of the Basic assembler that once it has finished assembling an instruction it ignores everything else on that line up to the next colon. Unfortunately we're stuck with it.

Forgotten fixes for Pelmanism

THANK you for publishing my program Picture Pairs in your January 1991 issue. Unfortunately the description of how to alter the sprite files containing the pictures referred to an earlier version.

In my latest version, which appeared on the subscription disc, any adjustments should be made as follows:

There is only one sprite file (as opposed to three) containing 124 pictures plus one joker. As before the Joker should be the last sprite in the file and each sprite should be numbered in ascending order, in steps of one starting at zero.

The numberSprites% variable in line 1172 should be set to the number of the Joker sprite – the total number of sprites less one. The rest of

Power computing

RECENTLY I have been rereading old copies of **The Micro User** and came across a method of checking the rounding accuracy of Basic routines. It was simple – calculate 1.0000001 to the power 134217728 . This stretches an 8 bit machine to the limits.

At the time BBC Basic version I came out pretty well in comparison with other machines, I decided to see what more modern machines could do and got these results:
The hand calculated method used the formula:

$$(1+x)n = 1+ nx/1! +n(n-1)x^2/2!+ n(n-1)(n-2)x^3/3!...$$

which needs about 50 terms before a stable answer to four decimal places is achieved. How does the Archimedes compare? – **Graham Evans, RAF Bruggen, BFPO 25**

● We've added Basic V to your list – as you can see it's almost identical to Basic II.

Machine/Language	Answer	Error
Hand calculated to four places	674530.4707	0.0
BBC Basic I	685090.00	+1.567%
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BBC Basic II/IV on the Master	685222.802	+1.585%
Casio FX82 using x y	674529.88	-8.757×10^{-5}%
Casio FX82 using Log	674530.4641	-9.78×10^{-7}%
TRS-80	8886690.0	+1117.463%
IBM PC	8850273.0	+1212.064%
Apple II	22723.9709	-96.631%
Zenith GW Basic	65536.0	-90.28%
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Supercalc 4	674530.4760	$+7.857 \times 10^{-7}$%
BBC Basic V (Archimedes/A3000)	685222.807	+1.585%

A rose by another name

THERE is an enormous amount of mostly unnecessary computer jargon around. What has to be understood is that from around 1950 till about 1975 all computing was done on mainframes, either owned by very large companies, universities or bureaux, and most schools used university computers on a bureau basis.

To serve the mainframes, a small corps of people of my generation grew up, and to keep out the uninitiated, we invented a language only we could understand – just as Cockney rhyming slang was coined to puzzle outsiders.

We had a plethora of programming languages to draw on: Binary, PL1, Algol, Fortran, Pascal, Logo, Lisp, Cobol, Snobol and many others, some best forgotten.

Around the mid-1970s progress in the space programme allowed cheap miniaturisation and the micro arrived. From small beginnings, we now have personal computers as powerful as our 1950s mainframes and cheap enough not to bankrupt us.

Although many of the terms we used have been inherited, not usually very happily or accurately, from mainframes, an additional set of jargon is growing fast.

I am not entirely against jargon. It's simpler to say Basic, for example, than Beginnners All-purpose Symbolic Instruction Code.

Every occupation has its own jargon. When we say we're going to paint the house, we are not usually going to pour paint all over it.

But I do feel it's time for someone to clean up our computing act, otherwise Artificial intelligence will arrive with its own jargon over which we will superimpose our old mainframe nomenclature.

Anyway, what do you mean by real time? Until we can design a computer which works at the speed of light, which is an impossibility at present levels of knowledge, it cannot be working in real time.

Whether it takes 10m/secs or 10 hours to do a job, "real time" is, of course, passing. The term is an advertiser's ploy, and to be treated with contempt. – **R.W. Hill, Woodford Green, Essex.**

● We think that – almost – all jargon is both justified and needed, but it suffers from degradation due to non-comprehension and salesmen.

As you point out, jargon is necessary in a subject in order to keep descriptions to a minimum: When a concept is invented a word is created (or co-opted from English) to refer to the concept. But if the concept isn't understood or misused it's not the fault of the word.

The definition of real time is *monitoring, reacting to and controlling physical world events as they occur.*

A program that handles a nuclear reactor is operating in real time, one that draws fractals isn't. It's hardly an advertiser's ploy – only the ignorance of those who misuse it should be treated with contempt.

Cleaning up the subject is impracticable, after all who is to be the final arbiter on whether a word is redundant or vital?

The real solution is to ensure that the words are properly understood. Jargon, in any subject, isn't invented to keep out the uninitiated. Only lack of understanding does that.

the information on the sprite file was correct. – Mike Whiteman, Lewisham, London.

486 Archimedes?

ARE there any plans to release a new version of Acorn's PC Emulator? At present I am studying a BTEC course in computing and hope to further on to a degree, I have been told that a 286 or 386 PC would be of great use at my degree course.

Is a 286/386 emulator for the Arc going to be produced? If not why not? Surely if lesser 16 bit machines by Atari and Commodore (may I add) enjoy these emulators in the form of additional hardware/software the Arc is up to the job.

Could you please look into this matter and advise me on what I should do. – R. W. Sillet, Yorkshire.

.

● There was a lot of interest in the Mach Technology 386 Expansion card for the Arc. Unfortunately this, and all the other products of this company, were worse than vapourware, they were more like *vacuousware.*

However we know of at least two reputable companies who are working on similar hardware add-ons, one a 286 card, the other 386. More than this we don't know – let's hope that they put them in a window so that we can have the Arc running properly as well as the PC.

ALL programs printed in this magazine are exact reproduction of listings taken from running programs which have been thoroughly tested.

However, on the rare occasions when mistakes occur corrections are published as a matter of urgency. Should you encounter error messages when you type in a program, they will almost certainly be the result of your own typing mistakes.

Unfortunately we cannot answer personal programming queries concerning these mistakes. Of course letters about suggested errors will be investigated without delay, but any replies found necessary will only appear in the letters pages.

ViewSheet on the A3000

IN REPLY to the letter from Dr A. Hay of London in the January 1991 ***Micro User*** *I have recently upgraded from the Electron to the BBC A3000. Although I've only had it for a month – and am still feeling my way around – I have managed to get the Electron version of ViewSheet running.*

All that is needed is to follow the instructions included on the Support disc in the following directory:

```
adfs::SUPPORT.$.Acorn.Emulati
ons.Viewsheet
```

Double clicking on the ReadMe icon will then supply the required information.

It took some time to work out the correct keys to use, but so far the following list allows me to edit my Viewsheet files originally set up on the Electron:

Shift+F2 = down screen
Shift+F3 = right one slot
Shift+F4 = up one slot
Shift+F5 = right screen
Shift+F7 = column heading
Shift+F9 = row heading
Control+F1 = up screen
Control+F2 = left one slot
Control+F5 = change R D
Control+F7 = down one slot
Control+F9 = auto entry
F3 = next window

I hope this will enable Dr Hay to investigate further. – **R.W. Sillett, Penkridge, Staffs.**

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Below are four screens each showing a different question and a choice of answers.

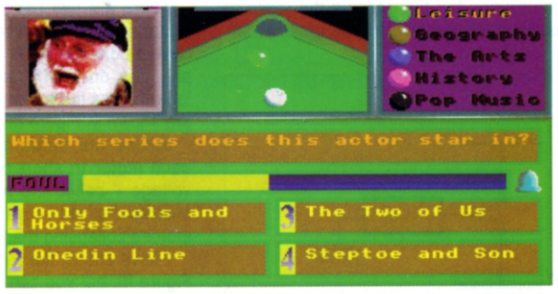
The first 30 readers out of the sack on 26 April – with the correct answers – will each receive a Superior game of their choice and a personal radio.

The questions

1

2

3



4

ENTRY FORM

Name _____

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_____

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The answers

1 _____

2 _____

3 _____

4 _____

I use (please tick the appropriate box) an:

Electron with cassette	☐
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If I win my choice of Superior Software games would be:

1 _____

2 _____

3 _____

Send your entry form by April 30 to: Superior Competition, *The Micro User*, Europa House, Adlington Park, Macclesfield SK10 4NP.

Motoring on

Mike Cook explains how to control moving models with your computer

ONE of the great joys of computer programming is when something happens other than on the screen, and perhaps the best example of this is when that something is movement. Moving models of all kinds are not only exciting to control with your computer but also are very instructive.

Many different types of motorised models can be used and the Lego system is perhaps the most flexible way of constructing moving models, although there are others on the market.

The one problem with commercial models is providing the computer interface. Where these are available they tend to be based on relays and are very expensive. Indeed I have covered the control of motors with relays in the Body Building article published in November 1985.

However, recently a motor driver chip has come to my attention which offers great flexibility in driving not only motors but also other heavy loads.

The output from the User Port can only supply in the order of about 1mA which is normally insufficient to drive any device, so we need a current amplifier to boost it. The LM18293 from National Semiconductors consists of four such amplifiers capable of delivering 1 amp each, and their big advantage is that they have a push-pull output.

A push-pull output is not some strange creature dreamed up by Dr. Doolittle, but describes the way in which a circuit can

THE BEEB BODY BUILDING COURSE

switch. Take a look at Figure Ia. This switch can energise a load by connecting one end down to earth. When the switch is open there is no connection at one end of the circuit – we can say it pulls the current through the load. Figure Ib is essentially the same, only we can say the switch pushes current through the load.

Now Figure Ic is a double pole switch, which can push or pull, in other words it can connect the load to either of the supply rails. Finally if you look at Figure Id you will see a switch equivalent of one of the amplifiers in the LM18293.

A push-pull switch controlls the output and an enable switch allows you to disconnect the load altogether. Of course in the LM18293 the switching is done by transistors, but the effect is the same as using a manual switch. The great advantage of a push-pull output with enable is that it is so flexible, we can use it not only to turn a motor on and off but also to change its direction and allow different types of motor braking to be implemented.

Figure II shows the pin-out of the LM18293. Notice that there are in effect four identical buffers, each with an input and output. There are two enable lines, so that each line controls two buffers. Also there are two positive supply connections, one for the switching signal and the other for the load.

This is just what we need, as often the motor's voltage is different from the 5 volts of the computer's logic. This supply voltage can range anywhere between 4.5 and 36 volts and each output can switch up to 1 amp.

The chip is constructed in a special way to help dissipate heat – four earth pins are connected together close to the centre of the carrier, providing a good thermal contact into the heart of the chip.

If you are using a printed circuit board you can make the heat sink part of the board, as shown in the diagram. However if you are not taking this course you can always add a clip-on heat sink.

Having said this, most applications will not need a heat sink at all as the chip will happily drive one watt in free air. As usual, the rule of thumb as to whether you need a heat sink or not is: Can you keep your thumb on it? If it is too hot you need a heat sink.

There are two basic ways to power a motor in a single direction – you can have a common earth or a common supply. The only difference is whether a logic 1 turns the motor on or off, and they are shown in Figure III.

Notice the diode connected across each motor to short out the backwards voltage – called the back EMF (Electro Motive Force) – generated by the motor's collapsing magnetic fields.

I have shown the two different ways in Figure III, but you can use the same way on each buffer in your circuit.

Now look at the table in Figure III and you will see we have a number of different options. In the simplest system you can wire the enable input to 5 volts and simply control each motor from one of the bits on the user port. This will give you flywheel braking control of the motors.

Flywheel braking is the effect we get when we do not simply deprive a motor of power but short it out as well. If we simply remove the power the kinetic

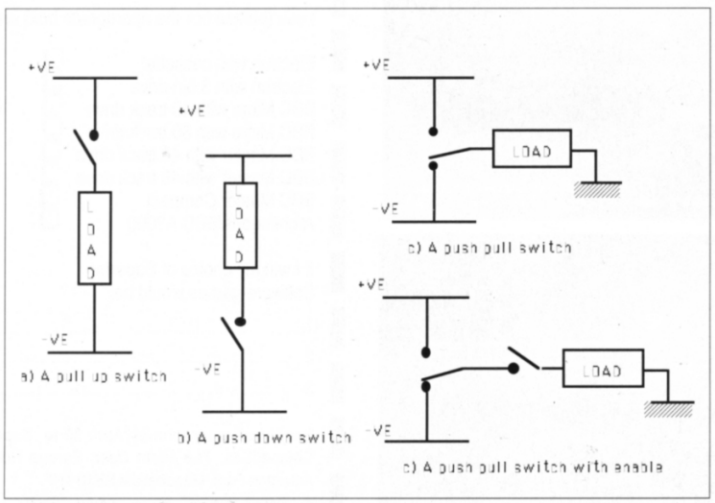


Figure I: Pushing and pulling switches

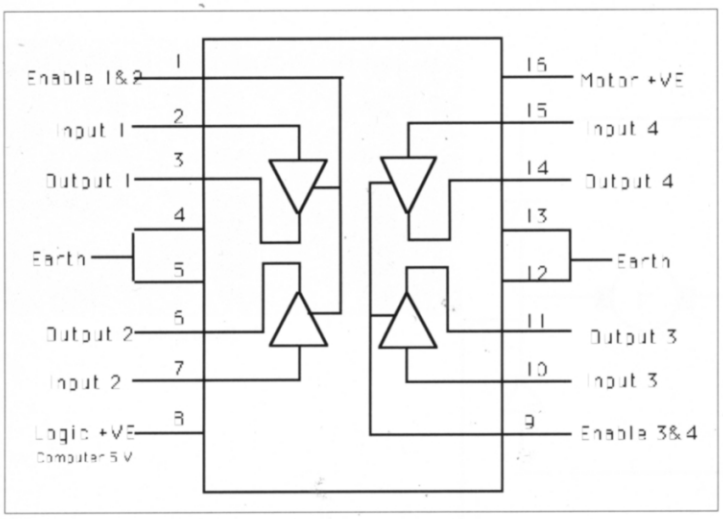


Figure II: Pinout of the LM18293

energy in the rotor and shaft of the motor keep it going.

What we have is, in effect, a generator. This produces a voltage in the same direction as that used to make the motor turn. However if we short circuit that voltage the kinetic energy is quickly drained into the short circuit. Therefore when we do this the motor stops quickly.

If we do not want this effect of rapid stopping we can use the enable line to turn the motor off. However in that case you will have to turn both motors off at once.

Turning the two motors on and off involves sending bits to the User Port. This has been covered many times but I am still being asked how it is done. Briefly then, make all the User Ports outputs by the command:

```
?&FE62=&FF
```

Then executing:

```
?&FE60=A%
```

puts the bit pattern represented by the binary value of *A%* on to the User Port lines. For example, to put bits four and zero to a logic one and all the other bits as zero, *A%* should be equal to 17.

There are several ways to control the motor's speed and perhaps the most effective is to generate chopped supply. What this means is very quickly turning the power supply on and off. The ratio of on to off time will control the motor's power. It is a similar process to that involved in modern light dimmers.

Fortunately there is an easy source of a chopping signal built into the user ports VIA, the shift register. This can be made to produce a recirculating output, in other words any given byte wide bit pattern can be repeated indefinitely with no software intervention.

All you have to do is to set it going and poke new values to it when you want to change the speed. First execute:

```
?&FE6B = (?&FE6B AND &E3) OR &10
```

which sets up the shift register into the recirculating mode four. Next:

```
?&FE68 = &FF
```

will set the recirculation or chopping speed. This has no effect on the motor speed as it is the ratio of high to low that controls the speed. This is done with the last instruction:

```
?&FE6A = &XX
```

where XX is the bit pattern you want. This will depend on the speed and whether you are pulsing a signal line that requires a logic one or a zero to turn the motor on. The table gives you the numbers to use here.

Once set going this will keep on producing pulses even when the program is not running. In fact the only thing that will stop it is pressing the Break key.

The chopped signal comes out of CB2 on the User Port, therefore you should connect this to either the signal input of the buffer or the enable.

I tried both and got better results when chopping the input signal. I could control the motor speed over a range of about 10 to 1.

When I used the enable chopping the run on effect of the motor meant that I could not get the speed down low. However this would change if the motor was under load.

The advantage of using the enable line is that you could chop this for all the motor buffers and then decide which motor you wanted to move with the appropriate input signal.

In order to control the motor's direction we need to be able to change the direction of current flow through it. To do this we need to use two buffers as shown in Figure IV.

Forgetting the enable for a moment, we have two control inputs. If they are different the motor is on and if they are the same the motor is off.

Here the diode arrangement is a little more complex, as we can't swap the diode connections at the same time. Note that here, unlike the single direction case, the diodes that are forward biased are passing the full motor current. Therefore they have to be rated to pass that much current.

If we want to control the speed of this the simplest arrangement is to chop the enable line as before. However you can chop the signal line if you want, but this is a little complex.

Say, for example, you are chopping pin 10 and using pin 15 as a direction control. When you are going clockwise – a zero on pin 15 – a logic one on the chop signal will turn the motor on, so the numbers you should use to control the speed are in the second column ofthe table. Now when you are going clockwise you have the

➤

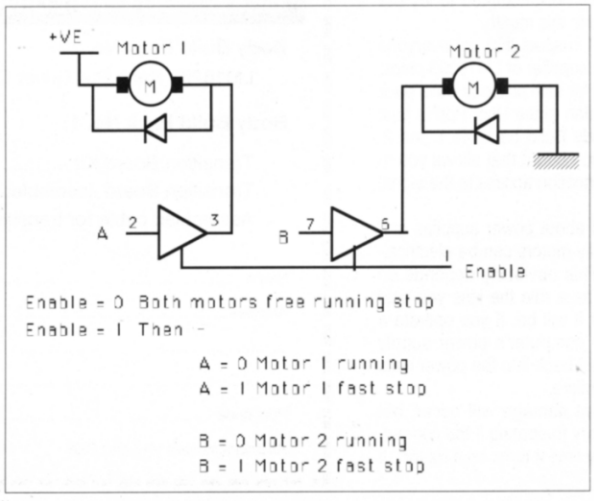
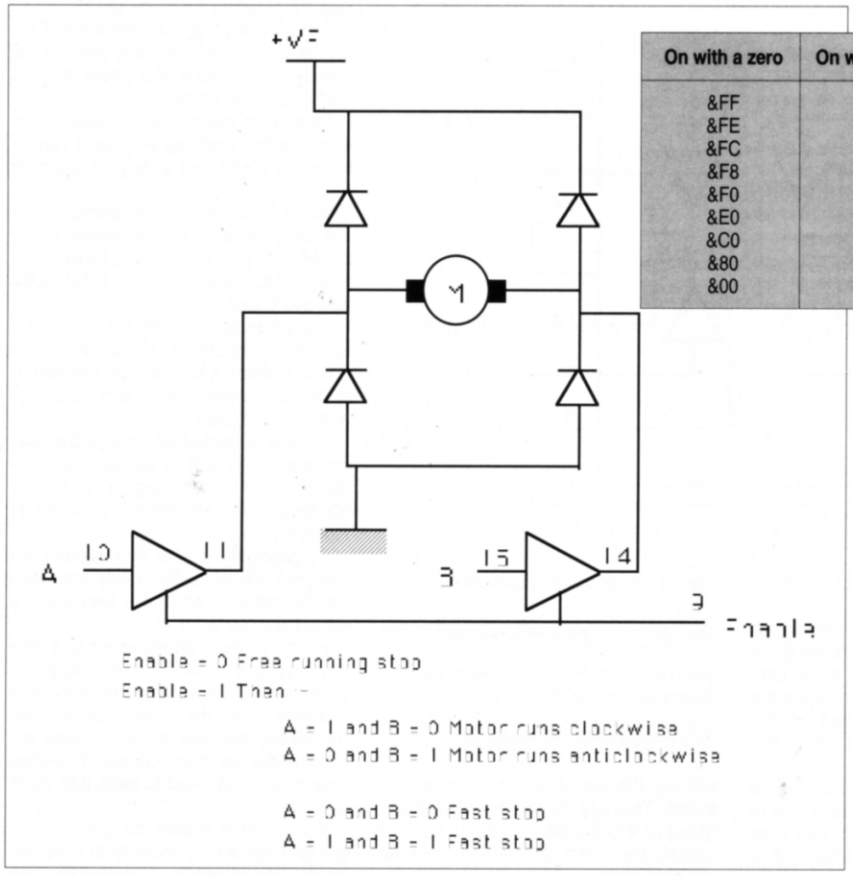


Figure III: Single direction control



On with a zero	On with a one	Motor speed
&FF	&00	Off
&FE	&01	Slowest
&FC	&03	Slow
&F8	&07	
&F0	&0F	Half speed
&E0	&1F	
&C0	&3F	
&80	&7F	
&00	&FF	Full speed

Speed control table

Figure IV: Bidirectional motor control

➤

reverse situation: Pin 15 has a logic one and a logic zero on the chop signal (pin 10) will turn it on, therefore you need to use the numbers in the first column of table.

With four buffers in the LM18293 you can control four motors in a single direction or two motors bi-directionally, and with enable chopping you can control the speed of all the motors.

As your own requirements are likely to be unique I have not attempted to lay out any printed circuits this month.

However, as I suspect that not everyone has access to a supplier of LM18293 chips, they are offered for sale as Body Build pack No. 72. Connection to the User Port is best made using Body Build pack No.1 and 2. This is a transition board that allows you to have screw connection access to the signal lines.

A final word about power supplies and motors. Generally motors can be electrically very noisy. This obviously depends on their type, but as a rule the less you paid for it the noisier it will be. If you operate a motor from the computer's power supply this noise can get back into the power lines and crash your micro.

No permanent damage will occur, but you will find it very frustrating if the computer crashes every time it turns on a motor. If this happens the first thing to do is to power the motor from a separate supply. If you still have trouble you can try placing 0.1uF capacitors across the motor.

In the unlikely event that you still get trouble you will have to isolate the power supply from the computer as, even though it is a separate one, it is still connected to the computer by the common zero volts or earth line. This can be done by using an opto-isolator. However, only go to these measures if you have trouble.

Armed with these techniques you can make your models come to life, control them through your computer and generally have fun.

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☐ LM18293 Push Pull Driver Chip £4.70

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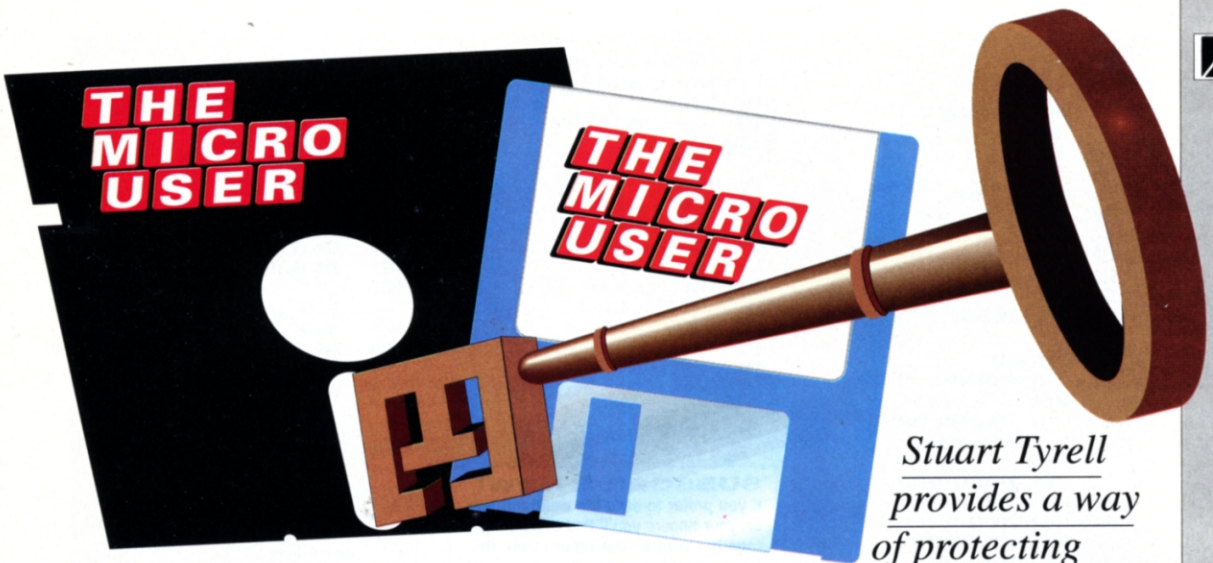

First line of defence

Stuart Tyrell provides a way of protecting your programs and data from outside interference

THE loss of files is something that haunts all micro owners, and it is something that could happen in many ways: By accident, using the utterly lethal *wipe command or, as Teri Paul pointed out in her PD column, as the result of some insidious virus.

Well, this disc protection utility will go some way to avoiding such a horrible happening.

Sensible Archimedes owners need some way to prevent programs from modifying their discs when running non-commercial programs for the first time, to ensure that the new disc contains the desired programs and not ones which could delete important data.

What happens is this: When a program attempts to write to the disc, the utility beeps and changes the border to a colour indicating the *severity* of the access. You can then decide whether to allow the write to take place, or not. The border changes to one of the following colours:

Red An attempt has been made to delete a file.

Yellow An attempt has been made to save memory to a file, saving a program for example.

Magenta An attempt has been made to open or close a file for update, or to rename a file.

Green An attempt has been made to alter the read/write attributes of a file, or to alter its load/save/execution address.

When the border has changed colour, you can press N to prevent the write from taking place and exit the program, or any other key to allow the write to take place.

In addition, if the disc access is taking place from within the DeskTop, a window will open in the centre of the screen. The title of the window indicates the write which is to take place. Press N, or any other key, as before, or use the mouse.

Type the listing in, ensuring that it is correct using the checksums, save it, and enter RUN.

The program saves a module called DiscProt. To use the utility, enter *DiscProt or double-click its icon from the DeskTop. The program will display a message to confirm that it has loaded. You may continue to use the micro as usual. The utility will survive a soft break such as a Reset or Shift+Break but not a hard break such as Control+Reset.

Using this utility, you can now use your discs with confidence, secure with the knowlege that you can trap any attempt to delete or change your valuable data.

Paranoia?

Any would-be virus writer could test to see if the DiscProt module was loaded and RMKill it before attempting to delete or modify files. You can avoid this to some extent by altering the module name – not the file name – in line 230 so that it can't be recognised.

```
   10 REM >DiskPsrce
   20 REM By Stuart Tyrrell
   30 REM (c) The Micro User
   40 MODE 0
   50 PROCassemble
   60 PROCsave
   70 END
   80 :
   90 DEFPROCassemble
  100 DIM mc 2048
  110 Help$="DiskProtect"+CHR$
9+"1.00 ("+MID$(TIME$,5,11)+")
"
  120 FOR pass=4 TO 6 STEP 2
  130 P%=0:O%=mc
  140 [OPT pass
  150    DCD 0
  160    DCD init
  170    DCD final
  180    DCD service
  190    DCD title
  200    DCD help
  210    DCD commands
  220 .title
  230    FNs("DiskProtect")
  240 .help
  250    FNs(Help$)
  260 .commands
```

```
➤

  270    FNs("DiskProtect")
  280    DCD 0
  290    DCD 0
  300    DCD 0
  310    DCD protecthelp
  320    FNs("DiskProtectAutho
r")
  330    DCD 0
  340    DCD 0
  350    DCD 0
  360    DCD authorhelp
  370    DCB 0
  380 .protecthelp
  390    EQUS "DiskProtect int
ercepts any calls to write or
delete a file. The border chan
ges to the following colours :
"
  400    EQUS CHR$13+CHR$9+"RE
D"+CHR$9+"Delete file."+CHR$13
+CHR$9+"YELLOW"+CHR$9+"Save me
mory to file."+CHR$13+CHR$9+"M
AGENTA"+CHR$9+"Open or close a
 file for update, or rename fi
le."+CHR$13+CHR$9+"GREEN"+CHR$
9+"Alter Attributes, or load/s
ave/execution address."
  410    EQUS CHR$13+"Press N
to prevent the write from taki
ng place and exit the program,
 or any other key to continue"
  420    EQUB 0:ALIGN
  430 .authorhelp
  440    FNs("DiskProtect was
written by S.Tyrrell for The M
icro User.")
  450 :
  460 .init
  470    STR R14,oldR14
  480    MOV R0,#&1D
  490    ADR R1,upcallcode
  500    MOV R2,#23
  510    SWI "OS_Claim"
  520    ADR R0,initmess
  530    SWI "OS_WriteO"
  540    LDR PC,oldR14
  550 .initmess
  560    EQUS "'DiskProtect' D
isk protector installed (c) Th
e Micro User."
  570    EQUB 13:EQUB 10:EQUB
10:EQUB 0
  580    ALIGN
  590 .final
  600    STR R14,oldR14
  610    MOV R0,#&1D
  620    ADR R1,upcallcode
  630    MOV R2,#23
  640    SWI "OS_Release"
  650    LDR PC,oldR14
  660 .oldR14
  670    DCD 0
  680 .upcallcode
  690    STMFD R13!,{r0-r12,R1
4}
  700    CMP R0,#3
  710    BNE notawrite
  720    SWI &107
  730    MOV R0,#0
  740    MOV R1,#24
  750    SWI "OS_ReadPalette"
  760    MOV R2,R2,LSR #8
  770    STR R2,oldcolours
  780    LDR R0,changeentries
  790    CMP R9,#6
  800    LDREQ R0,delete
  810    CMP R9,#0
  820    LDREQ R0,save
  830    LDR R4,number257
  840    CMP R9,R4
  850    LDREQ R0,closerename
  860    LDR R4,number259
  870    CMP R9,R4
  880    LDREQ R0,closerename
  890    CMP R9,#520
  900    LDREQ R0,closerename
  910
  920    STR R0,programcolours
  930
  940    ADR R0,programblock
  950    MOV R1,#7
  960    SWI "OS_WriteN"
  970    SWI "OS_Confirm"
  980    CMP R0,#ASC"n"
  990    BEQ haltprogram
 1000
 1010    LDR R4,oldcolours
 1020    STR R4,programcolours
 1030
 1040    ADR R0,programblock
 1050    MOV R1,#7
 1060    SWI "OS_WriteN"
 1070 .notawrite
 1080    LDMFD R13!,{r0-r12 ,PC
}
 1090 .haltprogram
 1100    ADR R0,mode0
 1110    MOV R1,#2
 1120    SWI "OS_WriteN"
 1130    ADR R0,noaccessmess
 1140    SWI "OS_WriteO"
 1150 .halt B halt
 1160 :
 1170 .service
 1180    STMFD R13!,{r0-r12,R1
4}
 1190    CMP R1,#&27
 1200    BLEQ init
 1210    LDMFD R13!,{r0-r12,PC
}
 1220 :
 1230 .programblock
 1240    DCB 0:DCB 19:DCB 0:DC
B 24
 1250 .programcolours
 1260    DCD 0
 1270    ALIGN
 1280 .oldcolours
 1290    DCD 0
 1300 .delete
 1310    DCD &FF
 1320 .save
 1330    DCD &FFFF
 1340 .changeentries
 1350    DCD &FF00
 1360 .closerename
 1370    DCD &FF00FF
 1380 .number257
 1390    DCD 257
 1400 .number259
 1410    DCD 259
 1420 .mode0
 1430    DCB 22:DCB 0
 1440 .noaccessmess
 1450    EQUS "Program aborted
 - access to disk denied by us
er - press Reset to exit."
 1460    EQUB 0
 1470    ALIGN
 1480 ]
 1490 NEXT pass
 1500 ENDPROC
 1510 :
 1520 DEFPROCsave
 1530 SYS "OS_File",10,"DiskPr
ot",&FFA,,mc,0%
 1540 PRINT'"Module saved as '
DiskProt'"
 1550 ENDPROC
 1560 :
 1570 DEFFNs(Text$)
 1580 [OPT pass
 1590 EQUS Text$
 1600 DCB 0
 1610 ALIGN
 1620 ]:=0
```

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If you prefer to save the wear and tear on your fingers you'll find this listing – together with all the others from this issue – on this month's disc, sent free if you subscribe to *The Micro User.*

Get it right ✓

```
  10 =     0 0
  20 =     0 0
  30 =     0 0
  40 = 6075 5
  50 = 126A D
  60 = 90DB 9
  70 = FD2E F
  80 = 9719 1
  90 = 98E9 4
 100 =  1F8 A
 110 = EB30 7
 120 = A1D2 B
 130 = 8FDA C
 140 = 4E48 C
 150 = 9CF6 F
 160 = 3DB8 D
 170 = BF16 1
 180 = 758A 6
 190 = 9C18 B
 200 =  48C 8
 210 = E7BD 2
 220 = FD02 F
 230 = B8DF 6
 240 = 5B46 4
 250 = EDDB 6
 260 = A75E 8
 270 = B8DF F
 280 = 9CF6 4
 290 = 9CF6 A
 300 = 9CF6 0
 310 = 106C 0
 320 = EF93 F
 330 = 9CF6 E
 340 = 9CF6 B
 350 = 9CF6 2
 360 =  156 F
 370 = 2E56 1
 380 = 4820 D
 390 = 45DA F
 400 = C609 1
 410 = C1CA C
 420 =  893 8
 430 = C1D7 3
 440 = 377B A
 450 = 9719 1
 460 = 6272 D
 470 = D6BB 1
 480 = E64E 8
 490 = A534 5
 500 = 6961 6
 510 = AFC8 A
 520 = 21A9 0
 530 =  803 C
 540 = E9E8 4
 550 =  1E3 3
 560 = 4655 B
 570 = 11B0 E
 580 = 24FA 8
 590 = DE0C 3
 600 = D6BB B
 610 = E64E 6
 620 = A534 A
 630 = 6961 6
 640 = 17F4 3
 650 = E9E8 D
 660 = B76C 0
 670 = 9CF6 B
 680 = 4929 6
 690 =  5F9 9
 700 = D6CC 3
 710 = 410A D
 720 = 7BE7 5
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 740 = F754 F
 750 =  27A E
 760 = 3975 5
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 780 = 6414 C
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 800 = E8DD D
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 820 = D487 A
 830 = 7A80 9
 840 = 6E34 8
 850 = 45DE C
 860 = 9B4E 7
 870 = 6E34 6
 880 = 45DE 1
 890 =  8A7 6
 900 = 45DE D
 910 = D1AD 7
 920 = 9855 F
 930 = D1AD 9
 940 = D519 3
 950 = BD08 4
 960 = 2355 F
 970 = C015 5
 980 = 6029 0
 990 = 3A34 5
1000 = D1AD 7
1010 = E0FF 0
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1280 = D639 B
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1320 = 2C12 4
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1340 = 3451 6
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1370 = FCF2 D
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1510 = 9719 3
1520 = 7A2C B
1530 = 3217 C
1540 = 8EBD 8
1550 = EDDF 7
1560 = 9719 3
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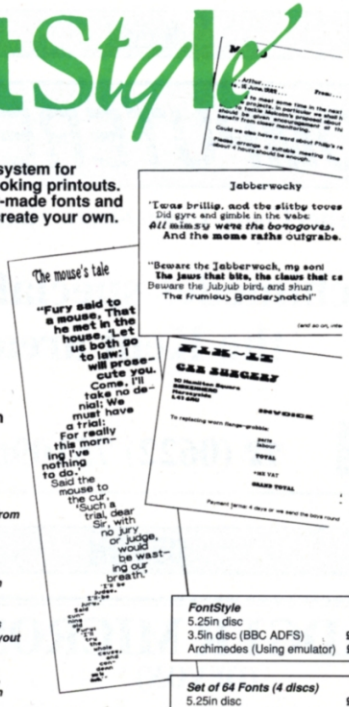

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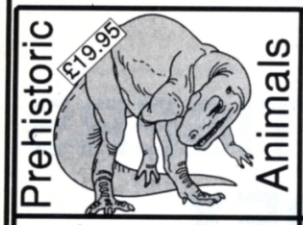

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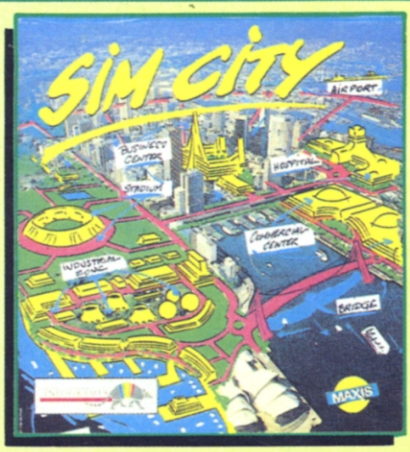

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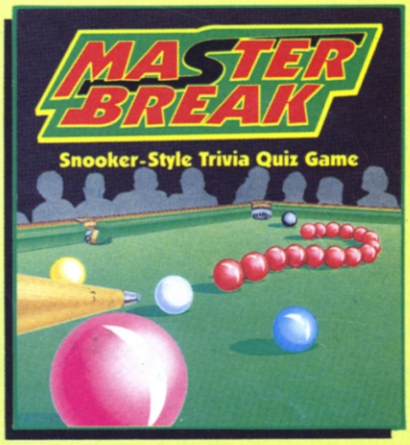

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